

THE IRON AGE

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SMALL COMPANY PROFITS FROM CLOSE PRODUCTION CONTROL

EXPERIENCE of the Stimpson Computing Scale Co. is proof that the small company as well as the large one can profit from close control of production and from installation of a standard cost system. Benefits include a large reduction in inventories, consolidation of departments resulting in increased efficiency, concentration of responsibilities, and ability of the management to ascertain instantly the profitable or unprofitable operation of any department.

SOMETIMES it is falsely assumed that because a manufacturing company is relatively small in size it automatically escapes inefficient practices which tend to creep into larger corporations. Naturally, its production problems are less complex than if it had attained a huge growth, but there still is a tendency on the part of the management many times either to over-organize the production control machinery or neglect it. There is a happy medium between these two extremes which yields the greatest possible returns.

By **BURNHAM FINNEY**
Detroit Editor, The Iron Age

through the maintenance of a high rate of efficiency.

Realizing these facts, the Stimpson Computing Scale Co., Louisville, Ky., recently installed a standard cost system and a production control policy based on a thorough examination of its business by Ernst & Ernst, certified public accountants. The

change already has brought many tangible benefits: inventories of raw materials, parts in process and finished products have been substantially reduced; the management can ascertain instantly the status of an order going through the factory; overhead expenses have been decreased by consolidation of departments; and the profitable or unprofitable operation of any department is shown.

The Stimpson company is engaged in the manufacture of computing and automatic weighing scales, electric coffee mills and electric meat chop-

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The cost department prepares for the management each month a summary of machines rebuilt or dismantled.

Production, Cost and Timekeeping Activities Merged

with the factory superintendent in active charge reporting to him. Two clerks handle all of the records.

According to the control system, the production, cost and time department is the neck of the production bottle. Work must flow through it promptly and smoothly or the production machinery is clogged. This situation has been created purposely, as it places responsibility for efficient operations on the shoulders of the general manager and the factory superintendent, without unduly burdening them with details. Of course, they have more details to look after than comparable officials of a large company, but they are not of such volume as to take their attention from the chief task of operating the company efficiently and economically.

Production schedules have as their basis a pre-determined minimum quantity of finished products, according to machine models, which must be kept in stock at the factory. This quantity is regulated in conformity with sales. The management has complete statistics on sales, in both

volume and machine models, during every year since the company's inception. These figures show regular and uniform tendencies with respect to the low and peak months of the year. Hence the company is able to control production and inventories in anticipation of future sales.

The number of machines to be placed in the hands of agents is determined by the number of salesmen and the volume of machines usually sold by each salesman. The stock of finished machines is based on the mean average of machines sold during the previous years, allowing for seasonal variations. Parts in process are similarly regulated. An analysis of parts sales likewise reveals the number of service parts which should be carried in stock.

Cards Form Basis of Inventory Control

After the minimum requirements of finished products, parts and raw materials have been ascertained, the amounts are recorded on cards, the complete file of cards being regarded as the foundation of the company's system of inventory control. As raw materials are received and fabricated parts are turned out by the factory, the quantities are entered on cards provided for that purpose. As factory fabricated parts are depleted, a requisition for supplies is sent by the production, cost and time department to the general manager, who issues a production order to bring the volume of parts up to the desired level. This, in reality, is a perpetual inventory system or an automatic control of production. It must be remembered that the production, cost and time department maintains and controls all records and no parts can be made, raw materials and other supplies purchased or maintenance and improvement work done without the approval of the general manager, in whom complete authority on such matters is lodged.

The foreman of each department

S. C. E. CO.-3-30-500-SIA

REJECTION TICKET

No. **500**

NOTE: ALL REJECTIONS MUST BE INSPECTED BY DEPARTMENT FOREMAN AND PRODUCTION MANAGER.

DATE _____ 193__

PART NAME_____ PART No_____
OPERATIONS COMPLETED_____ OPERATION NUMBER_____
COST PER 100 TO POINT OF LAST OPERATION—LABOR \$_____ MATERIAL \$_____ BURDEN \$_____
PIECES REJECTED_____ TOTAL LABOR \$_____ TOTAL MATERIAL \$_____ TOTAL BURDEN \$_____

DEBIT	ACCT. NO.	AMOUNT	CREDIT	ACCT. NO.	LABOR	MATERIAL	BURDEN
TOTAL			TOTAL				

EXPLAIN FULLY
CONDITION OF PIECE _____
REASON FOR REJECTION _____
DELIVERED TO RECLAMATION DEP'T _____
INSPECTED _____&_____
FOREMAN _____ SUFFT _____

A REJECTION ticket is filled out by the foreman for each part damaged in process and rejected and is sent to the cost department.

EVERY day the storekeeper of each stock room sends to the cost department a summary of raw materials and finished parts received.

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A reclamation order accompanies all equipment sent from manufacturing departments to the reclamation department, which in turn sends the order to the cost department after listing how it has disposed of the equipment.

S. C. E. CO. 2-30-1000-554

RECLAMATION ORDER

No. **1108**

TO RECLAMATION DEPARTMENT—THE MACHINE DETAILED HEREIN HAS BEEN ORDERED RETURNED TO FACTORY FOR REBUILDING OR SALVAGE. DATE _____ 193__

MACHINE RECORD							
SERIAL NO.	KIND OF MACHINE	MODEL	TYPE	YEAR MAN'G'D	REBUILD VALUE	REPAIR VALUE	NEW VALUE

SALVAGE RECORD							
PART NUMBER	NAME OF PART	SALVAGED TO OPERATION NO.	PIECES SALVAGED	LABOR		MATERIAL	
				UNIT	AMOUNT	UNIT	AMOUNT

S. C. E. CO. 2-30-1500-558

DAILY PRODUCTION SHEET

DEPARTMENT _____ DATE _____ 193__

PART NO.	NAME OF PART	CLASSIFICATION	PIECES COMPLETED	OPERATIONS COMPLETED	LABOR PER 100			MATERIAL PER 100		
					UNIT COST	TOTAL SCALERS	TOTAL N. & C.	UNIT COST	TOTAL SCALERS	TOTAL N. & C.

THE foreman of each department enters on a daily production sheet the parts completed and moved out of his department each day. Except on the last day of the month, the sheet also includes a record of parts semi-finished up to the last completed operation. This serves as a check on each department's efficiency.

enters on a daily production sheet the parts completed and moved out of his department each day. Except on the last day of the month, he also includes on the sheet a record of the parts semi-finished up to the last completed operation. This sheet is signed by the foreman, approved by the superintendent and delivered to the cost department, where the information is entered on a monthly departmental production summary. Incidentally, it is used as a check on the number of pieces produced in each department daily.

The summary is a guide in accounting for labor consumed in actual production. Each department's total labor is credited to the departmental labor account and charged to "in-process labor." This procedure discloses labor variances by departments and furnishes the basis for investigation and remedy of inequalities in rates.

Eliminating Duplication from Month to Month

At the beginning of each month the daily production sheet of each department is charged (in red ink) with semi-finished, in-process parts inventoried at the end of the preceding month. This is done to eliminate duplication of crediting during one month the semi-finished parts credited to the departmental labor account the preceding month. It like-

wise aids in determining labor variances as well as departmental efficiency. In this connection it must be borne in mind that part of the labor of each factory department is paid by the hour, although the majority of employees are remunerated on a piece-work basis. The way in which the semi-finished, in-process parts inventory works out is shown by the following example (all figures are merely illustrative):

Total actual labor paid to machine department for month of October, 1931.....	\$2,364.30
Total in-process parts produced during October, 1931, at standard labor rates.....	2,134.50
Labor variance in machine department during October, 1931	\$229.80
Efficiency of machine department	90.2%

The item of parts produced at standard labor rates, amounting to \$2,134.50, is charged to "In-Process Inventories" and the labor variance of \$229.80 to "Labor Variance." The latter is absorbed in "Cost of Sales." The "Direct Labor-Machine Department" account is credited with \$2,364.30. The foreman of the machine department is informed of his operating record for the month; after consultations between him and the management, means are developed for increasing the efficiency in his department.

Keeping Track of Finished Products

As products are finished by the factory and shipped to agents, records

are entered on consignment cards and machine serial cards of the finished product in factory stockroom and in hands of agents. Each day cards are transferred from the factory finished stock to agents' stocks as machines are consigned. Notice of shipment by factory is the basis for transferring cards from the factory file to the agents' file. Whenever machines are sold, transferred or exchanged by agents, removal of cards from the file is authorized by a daily report of agents' stock sales and transfers. Each agent's stock is verified by correspondence about every two months. This means that the company communicates with five agents every day, a simple and easy procedure. The only exception to this practice is at the end of the fiscal year, when all stocks in hands of agents are checked in this fashion.

All direct labor, either piece-work or day-work, is recorded on white time tickets, indirect labor on pink time tickets. Each ticket bears the part, number, operation number, name of operation and quantities of material handled. All time tickets are kept by days and filed weekly with receipted time clock cards in a locked payroll ticket file. Since they are used to determine the amount of money to be paid to employees, they must be approved by the department foreman, inspector and factory superintendent. Changes in the day-work

Equipment which is to be rebuilt or dismantled and salvaged is sent from manufacturing departments to the reclamation department, accompanied by a reclamation order which lists its serial number, kind of machine, model, year manufactured, whether it is to be rebuilt and the salvage record. When a machine is dismantled, the salvaged parts are listed on the reclamation order and delivered to the stockroom designated by the general manager. If a machine is to be rebuilt, the parts replaced are recorded on the reclamation order. When a machine is either rebuilt or salvaged, the reclamation order is sent to the cost department, where

FORM NO. 1000				
NO. 1000				
PRODUCTION AND FACTORY WORK ORDER				
FROM _____		DATE _____ 193 _____		
TO _____				
YOU ARE HEREBY INSTRUCTED TO MANUFACTURE OR TO COMPLETE THE FOLLOWING :-		NOTE:- ALL LABOR AND SUPPLIES USED ON FACTORY WORK MUST BE CHARGED TO THIS ORDER NO.		
		FACTORY ORDER NO. _____		
PART OR FINISHED PRODUCT NO.	DESCRIPTION	QUANTITY	FOR	TO BE COMPLETED AND SHIPPED BY

the data are entered on the summary sheet of machines rebuilt or dismantled. At the end of every month an inventory is taken, on the regular

stock inventory sheets, of the machines charged to the reclamation department, but not yet rebuilt or dismantled.

COMPARISONS of the properties of Aston-process wrought iron with those of puddled iron and mild steel of the accompanying analyses have been made by W. von Gutmann and H. Esser (*Stahl und Eisen*, Sept. 24, 1931).

The sulphur and phosphorus content of the Aston iron is higher than that of the puddled product, the silicon is about the same, and the carbon and manganese contents are lower in the Aston iron. No pronounced differences in structure are apparent in the two types of iron, although the slag inclusions in the Aston iron seemed somewhat larger in size.

Aston iron exhibits the same tendency to red-shortness as ordinary wrought iron, increasing rapidly as soon as a temperature of 1560 deg. F.

is reached; on the other hand, it possesses the same good welding characteristics.

Aston iron shows less tendency toward precipitation hardening on heat treatment for one-hour periods at various temperatures after normalizing at 1830 deg. F., annealing at 1250 deg., and quenching; this difference cannot be completely explained on the basis of the lower carbon content. It has less tendency to age-harden than puddled iron or Armco iron.

The toughness of Aston iron is

somewhat greater than puddled iron as shown by notch impact tests. Aston iron has a lower tensile strength but greater ductility, although before quenching it is also stronger.

Corrosion tests showed no attack by sodium hydroxide solution, but Aston iron was less resistant than puddled iron or Armco iron to attack by 1 per cent solutions of sulphuric acid and common salt.

Aside from a few details the properties of the two grades of iron are practically the same.

CHEMICAL COMPOSITION, PER CENT							
	C	Si	Mn	P	S	Cr	Cu
A Aston iron	0.032	0.092	0.17	0.14	0.017	0.42	...
A ₁ Aston iron	0.025	0.1	0.11	0.145	0.025	0.53	...
B Armo iron	0.015	0.065	0.028	0.006	0.030	0.042	0.05
R Puddled iron	0.045	0.096	0.43	0.066	0.008	0.62	...
B Puddled iron	0.05	0.101	0.45	0.068	0.009	0.58	...
P Puddled iron	0.04	0.084	0.44	0.06	0.006	0.68	...

[illegible]

control all movements of parts in process to be assembled into finished products.

VANADIUM PLAYS AN IMPORTANT R

By A. B. KINZEL AND C. O. BURGESS

Chief Metallurgist and Metallurgist, Respectively,
Union Carbide and Carbon Research
Laboratories, Long Island City, N. Y.

ALTHOUGH vanadium is an important constituent of almost every brand of high-speed steel manufactured today, little is known as to its role in this series of alloys. The now standard 18 per cent tungsten and 4 per cent chromium constituents were the result of developments and improvements before 1903. In that year, vanadium was added to the steel by Dr. J. A. Mathews. This proved to be an outstanding contribution, so that the standard high-speed steel of today is generally referred to as the 18-4-1 type—18 per cent W, 4 per cent Cr and 1 per cent V.

Various modifications have been attempted since then, but with the exception of the introduction of cobalt, no striking improvements have occurred. Vanadium has been increased to 2 per cent in many of the common brands, and at least one brand contains 5 per cent V in addition to the usual tungsten and chromium. The carbon has been gradually increased so that it is not uncommon to find 0.80 per cent in the standard grade, although the carbon in the 5 per cent vanadium steel mentioned above is approximately 1 per cent, and even 1.2 per cent has been made experimentally.

The role of vanadium has never been well understood, and although vanadium has been increased to 2.5 and even 5 per cent in certain high-speed steels, it has not been generally established that the higher vanadium contents result in superior cutting properties. However, in all of the investigations of which the writers are aware, the interrelation of the vanadium and carbon contents was not considered as a prime factor. The carbon content was held at 1.2 per cent or less—generally at the usual 0.65 to 0.75 per cent.

Theoretical Aspects

Although the role of vanadium is not understood, there are theoretical considerations which indicate definite reasons for the improved cutting efficiency due to vanadium. Refinement of the secondary grain is one distinct possibility. The well known action of vanadium in limiting grain size might well be expected to operate in high-

speed steels, and even though its action were not evident in the parent austenite grain, it might well function in producing minimum grain size in the ferritic mass. Vanadium is also a powerful carbide former; i. e., the carbide is extremely stable and has a high free energy. It is probable that vanadium carbides are more soluble in ferrite at high temperatures than the tungsten or chromium carbides.

If complex carbides were considered, it is possible that vanadium in these carbides would render them more soluble in the ferrite. With a relatively wide variation in solubility of these carbides in the ferrite at high and low temperatures, precipitation of a large number of very fine carbides in the matrix would be expected. These carbides might well improve the cutting efficiency without having apparent effects on the physical properties as usually measured. Moreover, increased solubility in the ferrite would tend to inhibit rejection of carbides to the grain boundaries during the transformation.

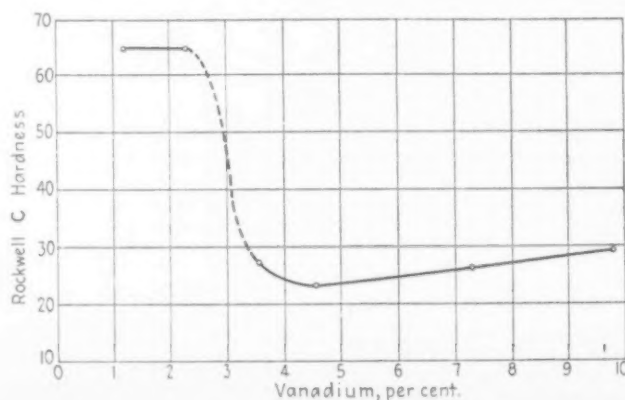
Thus the possibility of dissolving all the carbides in the austenite on reheating for forging is greatly enhanced, while grain boundary segregation is inhibited and the forgeability of the alloy consequently improved. Furthermore, as vanadium

carbide is very stable, it should reduce surface decarburization and thus make for higher cutting efficiency under conditions in which this plays a part.

Vanadium is a well known ferrite stabilizer, and increased vanadium in a steel already containing 18 per cent W and 4 per cent Cr, with the usual carbon content, restricts the gamma loop so that at optimum hardening temperatures appreciable quantities of delta iron are present unless the carbon is sufficiently high. In our opinion this delta iron formation is the reason for the common belief that vanadium in excess of 2.5 per cent is not beneficial when added to 18 per cent W, 4 per cent Cr high-speed steel of the usual carbon content.

Vanadium in Steels of Usual Carbon Content

In order to study the effect of vanadium, a series of heats was made with the usual carbon, tungsten and chromium contents and increasing percentage of vanadium. The analysis of these heats is listed in Table I. The heats were made in the 6-lb. induction furnace, cast into ingots and forged without difficulty at the usual temperatures. It is particularly interesting that the steels containing more than 3.5 per cent vanadium forged like straight carbon steels



ROCKWELL C
Hardness Plotted
Against Vanadium
Content of Otherwise
Standard High-Speed
Steel.

ROLE IN HIGH-SPEED STEEL



LITTLE is as yet known as to the role that vanadium plays in the series of high-speed steel alloys. The authors of the following paper, which was presented last week before the American Institute of Mining and Metallurgical Engineers, have thrown additional light on this subject through an extensive series of experiments. They find that, within limits, the cutting efficiency of standard and cobalt high-speed steels is increased with increases in the vanadium content, providing these increments are properly balanced with increases in carbon.

rather than like high-speed steels. The steels were cooled as $\frac{5}{8}$ to $\frac{3}{4}$ -in. squares in still air, and hardness readings were taken. The bars containing up to 2.30 per cent vanadium showed a Rockwell C hardness of 59, whereas the bars containing 3.5 to 9.77 per cent vanadium showed a hardness of 22 to 31.

All bars were then quenched from 1285 deg. C., and the Rockwell C hardness was measured. The results are shown in the illustration in which vanadium content is plotted against hardness. The sharp drop in the hardness curve with small change in vanadium composition undoubtedly is indicative of the border line at which delta iron largely suppresses the formation of gamma iron in the steels at high temperatures. When this occurs, the formation of a hard martensitic groundmass is inhibited, and a decided drop in hardness results. The slight increase in hardness of the steels containing from 4.5 to 9.77 per cent vanadium is believed to be

due to the precipitation hardening of the ferrite by the vanadium carbides.

A study of the microstructure of these steels shows that with vanadium at 3.57 per cent or over (the compositions corresponding to the lower branch of the curve), free carbides are reduced, and the groundmass does not show martensitic markings.

Interrelation of Vanadium and Carbon

In the belief that the effect of vanadium in higher percentages was due to the delta iron formation at the higher temperatures, carbon was added in order to offset the vanadium effect, the carbon being an austenite stabilizer at these temperatures. Several heats were made with carbon running from 1.20 to 2.20 per cent and vanadium from 3 to 7 per cent. The analysis of these is shown in Table II. Ingots 12, 14, 15 and 16 broke up during forging. Ingot 12 cracked badly. Ingot 15 cracked after some reduction, and ingots 14 and 16

cracked only after appreciable reduction, indicating that the analysis of these ingots is just beyond the limit of forgeability. No difficulty in forging was experienced with the other two ingots, 11 and 13, which gave Rockwell C values of 62 as forged.

Torch specimens of these heats were then prepared by holding one end of a $\frac{1}{4}$ -in. square in cold water and melting the other end with an oxyacetylene torch. This produced a temperature gradient covering the entire temperature range of interest. Quenching the specimens under these conditions retains in essence the structure corresponding to the various temperatures. Hardness tests along the specimen showed maximum hardness of 68 Rockwell very close to the fused material. Drawing the specimens at 560 deg. C. did not lower the hardness in the zone quenched from a high temperature, but did lower it in the parts of the specimen which were at lower temperature before quenching.

In order to further investigate quenching temperatures, specimens from heats 11 and 13 were oil-quenched from 1000, 1100, 1200 and 1285 deg. C. The Rockwell hardnesses obtained on these quenched specimens are shown in Table III. This indicates that in this steel, as in the usual high-speed steels, the optimum hardening temperature is the optimum practicable temperature; so 1285 deg. C. was used for the oil-quenching of tool bits for lathe tests. The lathe tests on material undrawn showed the residual stresses to be too high for practical operation. Accordingly, the specimens were tempered at 560 deg. C., and again lathe tested. It was particularly noteworthy that this tempering operation did not affect the Rockwell hardness.

It is also significant that on cutting 0.50 per cent carbon steel of 250 Brinell, no difficulties were experienced with spalling or cracking of the tool, nor were there any indications that the toughness of the material was insufficient. This study of the thermal treatment is necessarily limited in scope. It may be that higher quenching temperature or varying holding time at temperature, as well as higher drawing tempera-

TABLE I—ANALYSIS OF HIGH-VANADIUM STEELS WITH USUAL CARBON CONTENT

Heat No.	Composition, Per Cent					
	C	V	W	Cr	Mn	Si
1	0.65	1.22	17.29	4.02	0.52	0.61
2	0.80	2.30	17.09	4.05	0.55	0.70
3	0.64	3.57	16.89	3.95	0.61	0.72
4	0.70	4.55	17.21	3.91	0.51	0.62
5	0.72	7.29	16.94	3.76	0.53	0.80
6	0.70	9.77	16.16	3.92	0.61	1.10

TABLE II—ANALYSIS OF HIGH-VANADIUM AND HIGH-CARBON STEELS

Heat No.	Composition, Per Cent					
	C	V	W	Cr	Mn	Si
11	1.20	3.77	17.42	3.80	0.29	0.36
12	2.16	3.36	16.36	3.78		
13	1.52	5.05	17.02	3.76		
14	1.94	4.82	18.44	4.00*		
15	2.26	4.99	16.54	3.74		
16	1.81	7.34	16.87	3.97		

* Approximate.

TABLE III—QUENCHING TEMPERATURES

Heat No.	Rockwell Hardness C. When Oil-Quenched		
	From 1000 Deg. C.	From 1100 Deg. C.	From 1200 Deg. C.
11	58	63	66
13	60	63	65

TABLE IV—ANALYSIS OF HIGH-VANADIUM HIGH-CARBON COBALT STEELS

Tool No.	Composition, Per Cent					
	C	V	Co	W	Cr	Mn
21	1.18	4.31	8.76	17.57	3.74	
22	1.66	6.60	7.40	15.21	3.53	0.22
23	1.36	4.95	2.17	17.03	4.10	
24	1.40	6.22	5.70	17.54	4.10	

tures and longer drawing times, would result in still better cutting properties.

As the superior cutting properties of cobalt high-speed steels are well recognized, the effect of increased vanadium and carbon in these steels was also studied. Heats were made of analysis shown in Table IV. Ingots 21, 23 and 24 gave no trouble in forging, but ingot 22 broke during reduction and bars were obtained only with difficulty. On quenching and drawing these steels at the usual temperatures a Rockwell C hardness of 63 resulted. While this was lower than expected, the lathe performance was surprisingly good, so that it appears that carbon and vanadium produce the same phenomena in cobalt high-speed steels as in standard high-speed steels.

Results of Lathe Tests

It is generally appreciated that the only true test of a lathe tool is a production run under shop conditions. However, much may be learned from controlled lathe tests, particularly when the order of magnitude of the cutting performance is of interest rather than minor variations. There are many ways of lathe testing, and the writers chose the simplest one that appears to be reliable; namely, constant cut, feed and speed on a standard billet with measurement of total length of cut before regrinding.

Tool size was standardized at $\frac{5}{8}$ and $\frac{1}{2}$ in. and the values obtained at $\frac{1}{2}$ in. were corrected to $\frac{5}{8}$ in. on the basis of previous experience with the test conditions and type of steel being cut. Results on a single billet are shown in Table V. The order of magnitude of check tests agrees very well and there is a remarkable improvement due to higher vanadium with higher carbon. The same relative performance was found to hold using other test billets.

Discussion of Results

It is appreciated that the work herein reported is far from being a complete study of the field. The limitations of 6-lb. induction furnace heats are thoroughly understood, but general experience indicates that comparative results on material made in this way may be translated to material made under the usual mill conditions.

Owing to the limited data, we hesitate to draw conclusions, but the results are so striking that several generalities are certainly warranted. First, it appears that for each per cent of vanadium, 0.2 per cent of carbon may be added to the 18 per cent W, 4 per cent Cr, 1 per cent V, 0.70 per cent C high-speed steel, without encountering difficulties in forging up to 1.6 per cent C. The upper limit of vanadium and carbon contents has not been well established but re-

mains an interesting field for further study.

In addition to good forgeability, the steels containing the higher amounts of properly proportioned vanadium and carbon show a marked increase in cutting efficiency, with no appreciable falling off in toughness. The same improvements may be obtained by increasing the vanadium and carbon in cobalt high-speed steels. Further work is necessary in order to determine the optimum composition for commercial use, but it is evident that an improved high-speed steel may be produced by increasing the vanadium and carbon in proper ratio and that the optimum composition is not far from 1.5 per cent C and 5 per cent V. Since the work described was carried out, the writers have learned of the work of Certel and Eilender, which apparently was carried out contemporaneously with the work reported above, and which appears to substantially corroborate many of the findings recorded here.

Conclusions

1. Vanadium improves the cutting efficiency of the 18 per cent W, 4 per cent Cr high-speed steels if the carbon content is properly controlled.

2. With the standard 18 per cent W, 4 per cent Cr, 1 per cent V, 0.70 per cent C steel as a base, the carbon should be increased approximately 0.2 per cent for each 1 per cent increase in vanadium for optimum forgeability and cutting efficiency.

3. Five per cent V with 1.5 per cent C appears to be a satisfactory composition for 18 per cent W, 4 per cent Cr high-speed steels with good forgeability and improved cutting properties.

4. Vanadium and carbon increased in proper ratio improve the cutting efficiency of cobalt high-speed steel.

▲ ▲ ▲

New Type of New Steel Frame Building

Universal Building Corp., Sheboygan, Wis., has been engaged in constructing a new type of building, consisting of a structural skeleton steel frame with cast-poured shell walls, slab floors, etc., with cork-lined insulation on interior sides for plaster base. The exterior of this type of building is faced with brick or stucco. An addition to this type of construction consists of finishing exterior wall surfaces with aluminum or copper joints for brick or stone indications, using three-coat stucco work, with the last coat having metal joints. The copper and aluminum molding joints and the liners are run out and shaped by a die.

TABLE V—RESULTS OF LATHE TESTS

Test conditions: 250 Brinell, 0.50 per cent C steel billet. Speed, 118 to 120 ft. per minute; cut, $\frac{1}{8}$ in.; feed, 0.010 in.

Tool No.	Tool Type	Length of Chip Before Failure, Inches	
		First Test	Second Test
1	Standard high-speed steel.....	2,298	1,680
11	3.8 per cent V, 1.2 per cent C, high-speed steel.....	3,315	3,060
13	5.0 per cent V, 1.5 per cent C, high-speed steel.....	4,080	4,080
21	4.3 per cent V, 1.29 per cent C, 3 per cent Co, high-speed steel.....	6,890	
22	6.5 per cent V, 1.7 per cent C, 7.5 per cent Co, high-speed steel.....	5,525	
23	5.0 per cent V, 1.35 per cent C, 2 per cent Co, high-speed steel.....	3,910	



USING a visual electric gage, an operator tests 1000 rolls an hour.

Free-Wheeling Rolls Lapped to Close Limits

ALLOY steel rolls for free-wheeling units are lapped to close limits on vertical lapping machines and are gaged with great rapidity on a visual electric gage. Each lapping machine handles six loads an hour or a total of 900 rolls. One operator takes care of the battery of six machines.

WITH the almost universal adoption of free wheeling by American automobile makers has sprung up a new branch of the metal-working industry devoted to the manufacture of free-wheeling units and parts for these units. One of the essential parts is free-wheeling rolls, which are made in large quantities by the Bower Roller Bearing Co.,

Detroit. These rolls, finished by lapping, are held to extremely close limits, and high accuracy has been maintained through the use of electric visual gages with which the final inspection is made.

Alloy steel bar stock comes into the Bower plant from outside sources and the rolls are formed from it in automatic screw machines. The rolls

first go to the heat-treating department where they are hardened in electric furnaces, being held to a limit of two points on the Rockwell C scale. They then are tumbled to remove all scale from the corners, after which they are ground to size in a centerless grinder. When they emerge from the grinder they are about 0.003 in. oversize. The grinding machine is



One operator handles six lapping machines, each of which laps 900 rolls an hour. The lapping operation takes 8 min. with 2 min. allowed for loading and unloading.

equipped with a Danly automatic feeder to speed the work and to keep operating expenses at a minimum.

Rolls are placed in a Gardner double-end disk grinder and the ends ground to finish size with a tolerance of 0.002 in. Returning to the centerless grinder, they are brought down to within 0.0003 in. of the finish diameter. In this operation it is essential to hold the rolls to close limits for size, parallelism, etc., so that the lapping operation that follows may be most effectively performed.

Rolls are lapped on a battery of Norton vertical lapping machines. They are carried in a workholder between two cast-iron laps mounted on vertical spindles. The upper lap, attached to a swinging arm, does not rotate, but is free to float and finds its own level when brought in contact

with the pieces to be lapped. The lower or driven lap is mounted on a hollow spindle within which there is a "break up" shaft that, through a head, slide and pin arrangement, gives the workholder eccentric movement, the purpose of which is to obtain parallel parts and to secure equal wear on the faces of the laps.

One retainer of 150 rolls is lapped in about 8 min. One operator may run as many as six machines; he is limited only by his capacity for loading and unloading the retainers and gaging the test rolls. After the rolls are lapped and before they are removed from the machine, the operator tests one or two rolls for the accuracy of the outside diameter on a visual electric gage located nearby.

A paste lapping compound, containing No. 400 grit, is employed as a

lubricant and abrasive. Care must be taken to keep the lapping plates flat in order to maintain a constant diameter and to eliminate the possibility of taper on the rolls.

After being lapped, the rolls are dipped in a cleaner which is maintained at room temperature. This process is followed so that when the rolls are measured on the visual electric gage immediately after being cleaned, they are at the proper temperature, since a slight difference in temperature affects the diameter. Using the electric gage, an operator can gage about 1000 rolls an hour. This gage, having a magnification of 5000 to 1, is made by the Sheffield Machine & Tool Co., Dayton, Ohio.

The roundness of the rolls is also checked, this being done on the Sheffield gage, using a V block.

Deformations of Steel in Heat Treatment

EXACT measurements of the changes in diameter, length and hardness produced in cylindrical specimens of various types of steel by different heat treatments have been conducted by Portevin and Sourdillon (*Revue de Metallurgie*, June and July, 1931). Test pieces 5 in. long by 1 in. in diameter were used.

The result of annealing at 1290 deg. F. was to reduce the length and augment the diameter. Variations in dimensions increased with annealing temperature and rate of cooling. Prolonged exposure at constant temperature was without effect on the dimensions, since there is then no temperature gradient in the specimen to cause unequal stresses leading to deformations. If a test piece was subjected to a series of like treatments, the total changes in dimensions were straight-line functions of the number of treatments.

Influence of Quenching Temperature

The influence of quenching temperature was determined with the bath temperature and all other factors constant. Below a certain temperature, at which the viscosity of the metal becomes appreciable, the deformation caused by quenching is negligible. Above that temperature the cylinders exhibited common deformation, i.e., the increase in diameter and the decrease in length became more pronounced as the temperature was raised. At a still higher temperature, at which hardening with the formation of martensite set in, the change in density resulting from the formation of martensite caused quenching to tend to in-

crease the length and decrease the diameter. Finally when austenite appeared the preceding effect was annulled or the opposite changes in dimensions became detectable.

Thus the general curve of deformation against quenching temperature has three branches: common deformation, martensitic and austenitic, their temperature ranges being dependent on the composition of the steel tested, and the austenitic range disappearing in certain types.

Case hardening steels showed no appreciable deformation up to 930 deg., diminution in length with increase in diameter from 930 to 1380 deg., above which the length increased abruptly and the diameter diminished. This reversal results in a certain temperature at which the effects are compensated so that there is no change in length; also there is a temperature of constant diameter.

Carbon and Alloy Steels Studied

Similar curves were determined for hard and mild carbon steels and for nickel-chrome steels, the latter showing marked influence of austenite. The extent of the common deformation increases with the rigor of the quenching, the degree of inequality of temperature, which depends on the thermal conductivity, and is highest when the metal has a high critical temperature. Tests with a ferro-nickel alloy magnified the effect for the latter reason. The martensitic branch of the curve is so steep that small differences in temperature result in quite different changes in dimensions. The effect naturally in-

creases with the depth of chill. In the austenitic branch of the curve the deformation is largely dependent on the quantity of austenite produced, as may be illustrated by contrasting the dimensions of similar specimens of chrome steel quenched in oil and in water.

A slightly greater hardness was observed in the end of the test piece which entered the quenching bath first. The extent of previous work on the specimen had no sensible influence on the deformation on quenching; no previous treatment had any effect. Differences were observed according as the specimens were immersed axially or in a perpendicular direction. With disks of larger diameter than thickness the above observations as to length and diameter were reversed.

In tempering martensitic steel the influence of time on change in dimensions was the same whether the treatments were intermittent or continuous. Contraction in diameter and length was very rapid at 570 deg. F., reaching a maximum rate at 1100 deg. This contraction may compensate, in part at least, the expansion in quenching.

In mixed austenitic - martensitic steels the effect of tempering is complex, because the expansive tendency of the former component is opposed by the contractive tendency of the latter. Thus, in a special steel containing 2 per cent carbon and 13 per cent chromium, either expansion or contraction may occur in tempering according to the temperature from which the material was quenched.

STUDYING THE GASES OF SIMPLE STEELS

By HENRY D. HIBBARD
Consulting Metallurgical Engineer,
Plainfield, N. J.

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A REVIEW of our meager knowledge of the gases of steel brings out far more questions than answers, but it may nevertheless be worth while if only to state, in part at least, the problems connected therewith. The study of these gases is almost a virgin field.

Treatment by Gases Not Here Considered

This article deals chiefly with steel made by the open-hearth processes, and is limited in its scope to the consideration of gases originating in or accompanying the making of the steel. Later treatment of and by gases, another great unexplored field, is outside our subject.

While gases necessarily function in all steel-making processes, being both made and employed, some or all of those in the metal at the end work harm, and must therefore be controlled, that is, be eliminated or suppressed, either wholly or to the extent that the holes they form in the metal, if any, are reasonably harmless. In the ingot, gases are either in solution, with certain effects on the quality—some perhaps negligible—or in holes, which may be more or less harmful according to their number, size and location.

LITTLE is known about the gases in steel. There is need, according to the author, for systematic study of this subject by taking specific samples of steel and obtaining the facts regarding the gases generated through all stages of manufacture from the time the raw materials are charged.

Some of the influences of manganese and silicon on the gases of crude iron are traced in this article. Later instalments will discuss gases that appear in later phases of the steel-making process.

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In common with most investigations of steel phenomena, much that has been done hitherto must be repeated, and perhaps many times, until the various teachings have been definitely connected with the furnace practice that went before in making the steel. To progress as he should, the man in the melting shop must know the results of his efforts.

The matter is not simple or easy. To determine the gaseous history of

a single piece of steel through all its stages would be a formidable task, but one such set of determinations, taken with the other points of the steel's history, would be worth more to the steelmaker than all the results from the studies of the gases of steel that have hitherto been made put together. Such a feat, when done, will justly be regarded as the beginning of real knowledge of the gases of steel.

For results to be of practical value to the shop, the history of each example examined must be fully known, and particularly whether it is or is not normal, and if not, the valuation of its off-quality. But language is inadequate to convey complete knowledge of such a complex process as steel-making. Far better than history, one should have competent first-hand knowledge of the charge from which the sample will have been taken throughout its making, as well as of the tests, manipulations and examinations made upon it later. Its history must include full knowledge of the metal, slag and gas during and after manufacture, and the relation each sample bears to others from the same charge taken at different stages.

The whole story of the gases of a



single piece of steel as a part of its complete history demands full knowledge, including source, composition, quantity, means for control and effect, of the following:

- (1) Those in the charge materials.
- (2) Those evolved from the metal in the furnace during the successive stages from melting down to tapping.
- (3) Those evolved from the molten metal in the mold.
- (4) Those in the pipe cavity and in each kind of gashole in the ingot.
- (5) Those retained in the solidified steel.
- (6) Those evolved from the cold steel when comminuted.
- (7) Those evolved from the solid steel when heated to degrees between room temperature and fusion.
- (8) Those evolved from the steel when again melted.
- (9) Those liberated when the metal is dissolved by various solvents.

Each of these will now be considered. Some may be unimportant to the steel maker, but until known to be so they may not properly be ignored. The gases to be found will include varying proportions of the known CO_2 , CO , H_2 , N_2 , and ammonia (NH_3), and in some cases, at least, perhaps the unknown hydrocyanic acid (HCN), and various hydrocarbons. None of them, except possibly nitrogen, will be combined with iron.

Oxygen, though a gas, is, in steel, probably always combined with iron and is not, therefore, to be considered as a gas, though from its ability to form CO_2 and CO within the metal, its action must always be kept in mind in any investigation of the gases of steel. In the form of dissolved FeO it is a hardener, and perhaps a strengthener, while as Fe_2O_3 it is insoluble and a weakener.

The interpretation of the results, the lessons they teach and their beneficial application in practical work will come only after a great number of determinations have been made. The importance of knowing the presence and quantity of some certain gas in the metal at some particular stage of manufacture may lie in that it points to some other ingredient or some condition of the metal, rather than it exerts a noteworthy direct influence of itself.

Gases in the Charge Materials

Open-hearth charges almost universally consist of crude iron and steel scrap.

Gases in the crude iron of the charge are important, though to an unknown degree. By heating samples to redness, in a vacuum, Parry obtained from white iron about two volumes of gas, while from gray iron

he got from 100 to 300 volumes, mostly CO and H_2 . Higher temperatures might possibly have released still more.

White iron, in which silicon is always low, is rarely if ever used in the open-hearth charge, though usually for the reason that, if smelted with coke, it is likely to contain too much sulphur. White and mottled iron, smelted with charcoal, may be quite free from sulphur, and some grades, usually having high manganese, as some Swedish irons have, are suitable.

There is some ground for holding that manganese in crude iron has pronounced solvent effect on hydrogen, for a rimming steel charge in which the manganese in the crude iron is high is likely to have an unduly great amount of skinhole gas, and as a consequence to be rather thin-skinned. The high manganese in the crude iron gives high initial, and consequently high residual, hydrogen in the bath metal, for, due to high manganese in the metal, the boil is inadequate and the solvent power of the metal for hydrogen is correspondingly high.

Correct Silicon Content Important

With too low silicon in the charge and, as a consequence, too little gas, the boil of the bath may be too gentle; while with too high silicon it may be at first too quiet and, later in the heat, when the silicon has been oxidized and so eliminated, too active or frothy.

Molten crude iron, while freezing, has been found to give off gases, the larger part of which—roughly about half—was carbonic oxide, while hydrogen and nitrogen each constituted about one-fourth each, quantities of gas not being stated. These proportions varied widely in different irons. So, direct molten iron may introduce gases to the bath metal which would have been expelled, in part at least, by solidification.

The quantity of boil—meaning its vigor multiplied by its duration—would be greater with gray iron in the charge than with white; but the gray would also introduce more hydrogen, which gas is particularly troublesome in making rimming and some grades of partly-killed steels. This will be referred to later.

Hydrogen in Pig Iron a Source of Trouble

Knowledge of the gases in crude iron might, therefore, be extremely helpful. Perhaps the first thing to be done in controlling the amount of hydrogen entering the bath metal is to limit that taken up by the crude iron in the blast furnace. This would

compel the latter to make suitable iron, or at least to send to the steel plant only such as is suitable and can be advantageously used.

Steel scrap is not likely to contain gases of compositions and in quantities which notably affect the processes of manufacture and properties of the product. Still, the possibility of such a case should be kept in mind as a clue to the explanation of abnormal steel. An undue amount of rusty scrap is held by some to tend to inferior quality in the product, though, if that be true, no explanation is given why oxide of iron in the charge materials should have a different effect from that added in ore. Silicon-steel scrap may, of course, contain much dissolved gas which will appear as the silicon is oxidized.

(To be continued)

New Coated Electrode

QUIET operation, with little or no sputter, is a feature of the new Hi-Tensile coated electrode being placed on the market by the Page Steel & Wire Co., Monessen, Pa. As the arc is free burning, the molten pool of metal can be observed readily and the amount of metal deposited can be judged accurately. Little metal is lost due to spatter, a feature emphasized as making for economy of operation.

The grain structure of the weld is essentially the same as that of mild steel and boiler plate base metal. Penetration is deep and the welds are sound. In strength, the finished weld is equal to that of the base metal with a total elongation of over 30 per cent when pulled to destruction. The weld is ductile and responds readily to heat treatment. Reverse polarity is not required. With straight polarity, the speed is said to be equal to that of any other type of electrode using reverse polarity. If reverse polarity is used, even faster speeds may be obtained. The electrode can be bent to a reasonable degree without the coating peeling or falling off. The coating is moisture proof and requires no baking before use.

The Steel Founders' Society of America, Inc., Graybar Building, New York, in its monthly survey, notes an increase in bookings in December, compared with November, with 2.3 per cent more foundries reporting new orders above 50 per cent of capacity. Bookings in December were 15.6 per cent of rated normal capacity, with 59 member foundries reporting, compared with 16.2 per cent in November when 62 members reported and 41.4 per cent in December, 1930, when 73 members reported.

EVALUATING PROTECTIVE COATINGS FOR LIGHT METALS

By J. L. McCLOUD

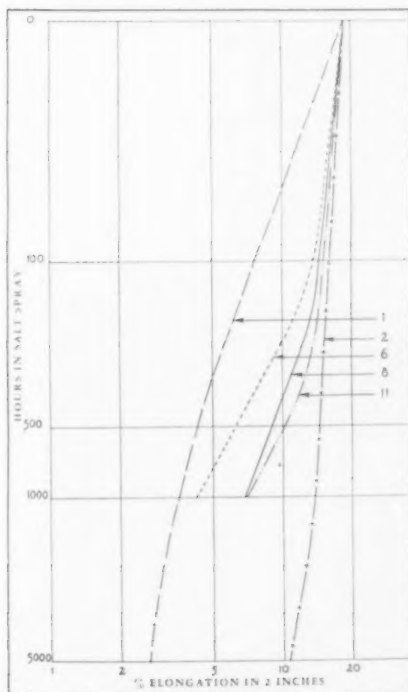
Metallurgist, Ford Motor Co

INCREASING interest in air-planes has brought into greater prominence the finishing of aircraft. The newer type of metal ship has necessitated a change in methods of evaluating paint coatings.

Metal ships are constructed largely of aluminum alloys, with some use of mixed construction, such as steel and aluminum alloys. The choice of these metals is governed largely by what may be called "form"; that is, if the member must be of certain strength and is large enough to have inherent stiffness, it may be made of steel; otherwise it will be of aluminum alloys.

Strong aluminum alloys have weight-strength ratios equal to heat-treated alloy steels; they also have excellent stiffness. With the use of such materials and because, with

From an address before the American Chemical Society.



Results of a comparison of elongation loss between uncoated duralumin and several other systems, when salt spray is used.

equal weight, that part is stiffest which has the greatest surface, corrosion prevention becomes paramount. Not only does design demand such a distribution of metal, but safety likewise requires that the metal shall not be lost in any service.

Engineers and chemists in investigation of materials must subject them to the most severe service conditions ever to be encountered. They must then prepare to overcome the effects of such service. Corrosion in metals starts from the surface; in a structure that is largely surface it must be prevented from ever starting. Another reason for this surface importance is the type of corrosion occurring in light metal alloys, namely, intercrystalline.

Steel is affected mostly by pitting of the surface, whereas the light alloys become corroded along their grain boundaries without of necessity being pitted. The latter process, therefore, is much more difficult to detect by observation, and the effect may be quite pronounced without being appreciably visible. If we consider the effect of corrosion on the two types of metal, that on steel is to lower its tensile strength and that on light alloys is to lower their elongation or extensibility. This latter is referred to as an embrittlement. To be sure, in attacks of either type, both results occur but the more important effects are as above noted.

In all older work on corrosion protection, the observations and ratings have been on appearance. In this study of the value of protective coatings over light metals, test bars of thin 0.012 to 0.014-in. duralumin have been exposed to corrosive conditions. The test pieces in any series are all cut from the same sheet or strip of metal. They are of quenched and aged metal of the following analysis: copper, 4 per cent; manganese, 0.5 per cent; magnesium, 0.5 per cent; aluminum, the remainder.

The bars are then tested in dupli-

cate to determine their tensile properties, strength and elongation; that is, the amount of permanent elongation at the point of rupture expressed in percentage of the original gage length. The test pieces are coated as desired and then tied together in groups with half-inch wooden spacers between them. These packages are placed in the salt spray box so that the pieces are in a horizontal position and edgewise. This arrangement gives uniform corroding conditions. The salt spray box keeps the test pieces continuously surrounded with fog-like spray from a 20 per cent sodium chloride bath, air blown into the box through a nozzle producing this condition.

As the pieces deteriorate in the corrosive atmosphere, similar pieces are retested for the same tensile properties and their properties are plotted against time. This procedure



Loss in strength suffered by thin 0.005-in. steel pieces treated similarly to those represented by the other chart.

affords a better picture of the actual progress of corrosion and conversely of protection against it than ratings by observation alone.

One of the charts shows results of a comparison of elongation loss between uncoated duralumin and several other systems. All the coated test pieces were first given the various primes as noted and then finished with an aluminum lacquer of the auto-finishing type with a fine-particle pigment. The primes were all air-dried for various periods of time, according to their types, prior to the application of the lacquer coat. Prime No. 1 has iron oxide as a pigment,

No. 2 zinc chromate, and No. 6 lead chromate, all of which are contained in the same type of synthetic resin varnish vehicle. Nos. 8 and 11 are so-called "oil base" primes, the former a gray, the latter an iron oxide red. Both were found to require 24 hr. to dry, in contrast with the 4 hr. of the former primes. These show clearly that both proper vehicle and proper pigment are needed.

The other chart shows loss in strength suffered by thin 0.005 in. steel pieces similarly treated. In this test, No. 1 is identical with No. 1 in the first chart.

These tests are, of course, difficult

to evaluate in terms of airplane service, which varies much. A ship constructed of duralumin, in usual service over land only, requires no protection except that for the skin. But in sea and coastal service, protection becomes necessary in direct proportion to the exposure of the ship to salt air and spray.

In conclusion, the above experiments have made it possible to evaluate positively different coatings and, by this evaluation, to devise a coating system which gives remarkable protection for light alloys over long periods of time.

Six-Ton Coal Bridge Discharges Upon Belt Conveyor

A NEW development in coal-handling bridges has been constructed by Wellman Engineering Co., Cleveland, as part of a modernization of the coal-handling system of the by-product coke and gas plant of the New England Fuel & Transportation Co., Everett, Mass. The Koppers Construction Co. served as engineer and contractor for the complete coal-handling system and

collaborated with the Wellman Engineering Co. in the bridge design.

This bridge has a span of about 230 ft., with short cantilevers overhanging the pier and shear leg. The pier is about 81 ft. high and the shear leg 38 ft. The machine is rope-operated and carries a 6-ton bucket. Speeds are proportioned to produce a capacity of 600 tons an hour. The closing and opening of the bucket are

controlled by separate motors, as is the trolley travel. These three mechanisms are located in a machinery house on top of the bridge over the pier leg, and are controlled from an operator's cab suspended from the bridge span adjacent to the pier leg.

Runways consist of two 100-lb. rails spaced 8 in. on centers under the pier leg and a single rail at the shear end.

A hopper is located in the tower for receiving the discharge of the bucket. A feeder at the bottom of the hopper discharges coal on to a trunk-line conveyor extending the length of the storage, parallel to the pier runway and outside the main span. This receiving hopper is guided by the pier, but travels on separate wheels running on the pier runway.

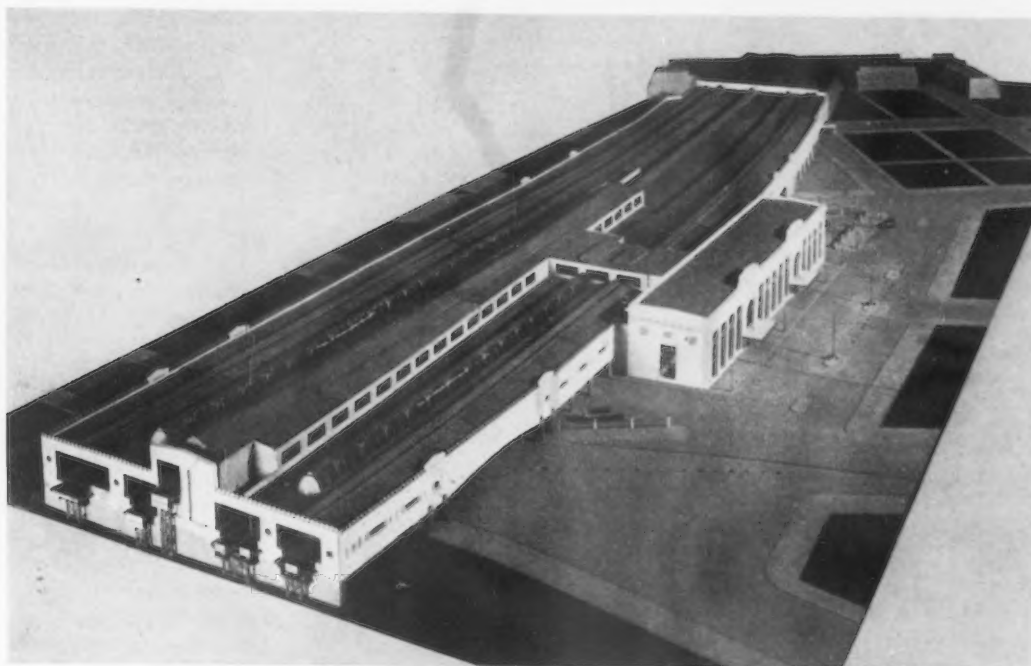
In structural design the bridge is unique in that practically all chords and web members are girder beams. The gusset connections to the chords are connected to the beam webs through slots in the beam flanges. This results in a simple and substantial construction and eliminates all troughs and pockets where dirt can collect, and is very accessible for painting and repairs.



COAL dropped by the bucket in the hopper passes down on to the belt conveyor at extreme bottom, for distribution where needed.

Arrangement of trucks carrying pier leg and the (separate) hopper. Hopper wheels, on pier wheel tracks, appear as at A.





In this scale model of the Newark, N. J., terminal the buildings may be removed, exposing the streets and foundations beneath, so that traffic routing may be studied.

SCALE MODELS SERVE EXECUTIVE, ENGINEER AND SALESMAN

▲ ▲ ▲

By G. S. HERRICK

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CONSTRUCTION of scale models traces its history to the days of sailing ships, when a scale model was usually made prior to building. In an industrial era, the scale model continues to serve a variety of purposes. New and old machines, tools and other equipment and the entire shops and acreage of plants have been reproduced on a small scale by the model maker.

In industry, the scale model serves executives and engineers, salesmen, exhibitors and others. It may be built for exhibition of equipment too large for convenient transportation; it may supply the salesman of heating furnaces, boilers, gas stoves, patented ladders or scaffolds, special railroad car couplings and other devices; it may aid the executive or designer of automobiles and equipment to visualize a new model; or it may provide the photographer with a small replica,

which lends itself to proper lighting and background better than the full-sized object.

Even when the blue print superseded the scale model of sailing ships, the builder and designer continued to seek a three-dimensional replica of the vessel's hull.

Early this year, some 20 different hulls, about 16 ft. over all, were made, scaling down the two 1000-ft. passenger liners projected at that time for Atlantic service by the United States Lines.

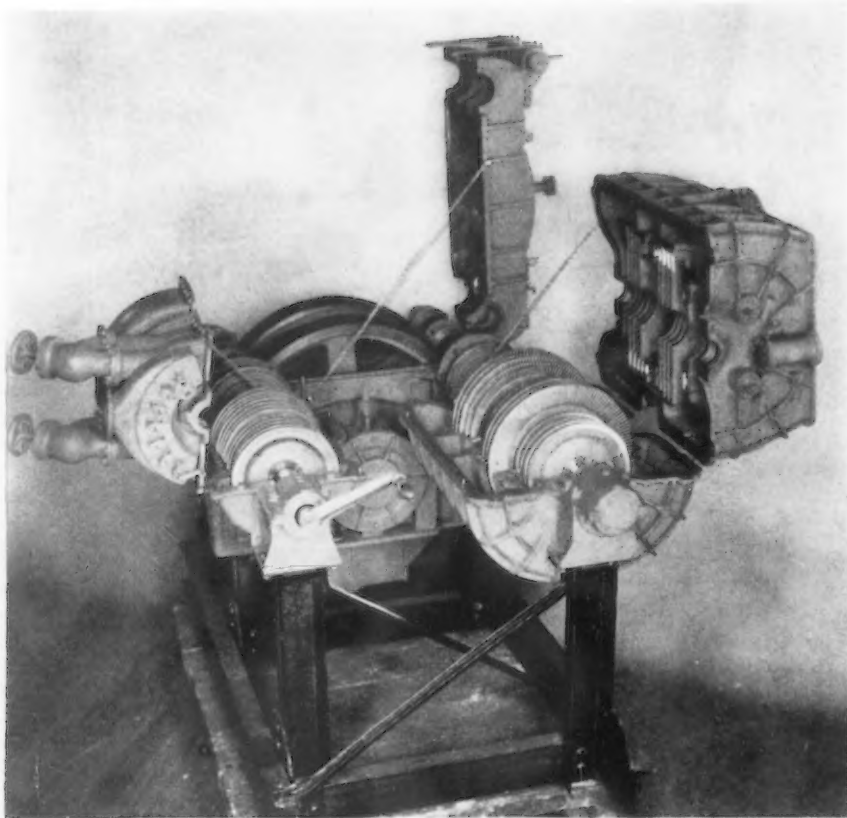
Motor Car Makers Use Scale Model

Recently, the automotive industry has appeared as a user of the scale model. The Peerless Motor Car Corp., Cleveland, has had models of new designs, $\frac{3}{4}$ in. to 1 ft., made chiefly for photographic purposes, as the photographer was able to obtain lighting effects almost impossible of

attainment when a full-sized motor car was used.

A 1931 model for the Marmon Motor Car Co., Indianapolis, designed by Walter Dorwin Teague, New York, was reproduced on a scale of 1 in. to 1 ft. This scale model, complete in detail, was then photographed in many positions and projected full size on a screen, so that executives and engineers of the Marmon company might see the actual car before manufacturing. This method of presenting a new design was considered by the designer as quite satisfactory and less costly than making a full-sized model of the new car.

Some months ago, a model of the proving grounds of the General Motors Co. was constructed with landscape and the trial highway on which small cars traveled. This was for exhibition, and at present the company is engaged in making a model



automatically carries shells and loads them into the guns on a modern warship. This academy also has a scale model of a compound turbine with reduction gears, the top of which when removed exposes the stationary and moving vanes.

Brass Sheets Largely Used

While a wide range of metals, including thin-gage sheet steel, are used at times by the model manufacturer, sheet brass, ranging from No. 22 gage to as heavy as $\frac{1}{4}$ in. thick is used for most purposes, the finished model being coated to simulate the metal in the original. Also, because of easy working qualities, small castings are generally made from Britannia metal or lead, after which they are suitably coated. The shop equipment of the model maker consists of standard machine tools, including power saws, sensitive drills, a small milling machine and the precision lathes used by jewelry manufacturers.

Scale models are being increasingly used, and as constructed today, not only reproduce for museums the machinery and tools of the past, but provide valuable exhibits of modern equipment and production methods for use by the salesman, engineer, architect, designer, technical student, and for the executives of companies to visualize and suggest minor alterations in new products to be produced in volume.

of the De Soto plant of the Chrysler Motor Co. to be exhibited at the coming automobile shows.

Shows Straight-Line Assembly

In this model the observer sees, through the windows of a well lighted factory, straight-line assembly of a modern motor car from the start to the finish, including the driving of automobiles away from the factory to waiting cars on a railroad siding.

In this case it was impossible to scale down uniformly, since for exhibition the entire model had to be not more than 20 ft. long, while the factory is a half-mile in length. However, after establishing the possible maximum of the model plant, the equipment was made to conform in size and as far as possible in detail.

Scale Models of Machines Useful

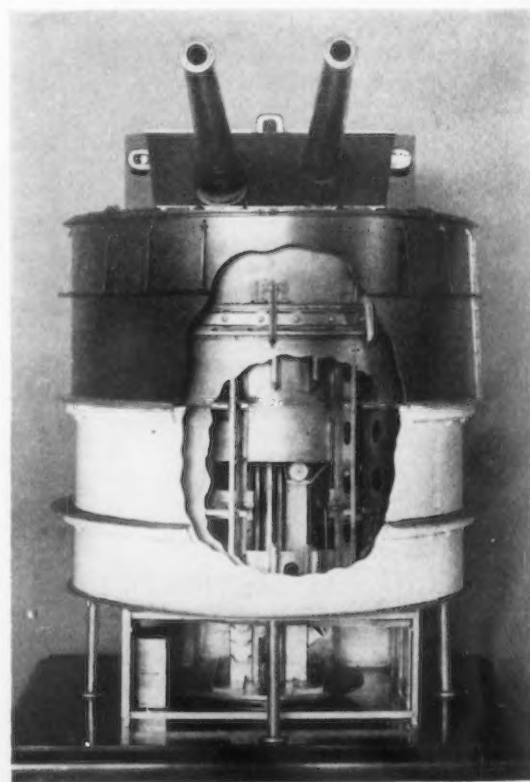
The Bethlehem Steel Co. has a scale model of a large pulverizer for exhibition, and the Westinghouse Electric & Mfg. Co. has recently been using a model apartment building, through the windows of which may be seen replicas to scale of the various electrical appliances made by the company.

Manufacture of working models for instruction is part of the business of the model maker. Reduced usually to a scale of $\frac{3}{4}$ in. to 1 ft., these models of engines, motors and large caliber guns are used by naval acad-

emies and schools in this country and abroad. Recently a complete working model of a battleship gun turret was built for the Argentine naval academy, so that the future naval officers could study the actual machinery which

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NAVAL students in Argentina learn about turbines from this $\frac{1}{16}$ th size scale model of a compound turbine with reduction gears. Movable vanes of the turbine may be operated by the handle. (Above.)

▲ ▲ ▲
A BATTLESHIP gun turret, scaled down to $\frac{3}{4}$ -in. to one foot, is automatically operated to instruct students at the Argentine naval academy in the conveyance of shells into the breeches of guns.



Rustless Steel Castings Must Be Made With Unusual Care

Pouring Temperature, Design and Control of Carbon Are Among Factors Affecting Product

THE 18 and 8 rustless steels have given the steel foundries great difficulty in producing sound castings, according to the experience of John Howe Hall, technical assistant to the president, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., which he related in a recent address before the New York Chapter of the American Society for Steel Treating. At the same time much of this material has been turned out which is unsatisfactory for corrosion resistance because of improper composition.

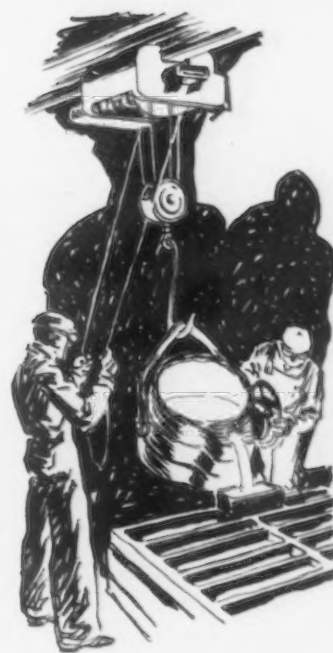
Foundries naturally have to remelt a considerable amount of metal in the form of heads and gates, he said, and it has so far been found impossible to remelt 18 and 8 scrap in the ordinary type of electric furnace, without having so much carbon "pick-up" as to exceed the allowable limits of that element in the finished steel. It follows that much of the steel for castings produced in arc furnaces has been so high in carbon as to be unsatisfactory for resisting rust and corrosion. The foundries equipped with melting units in which the carbon can be readily controlled are in a preferred position in the production of 18 and 8 and similar steels.

Pouring Temperature Important

The pouring temperature in handling these alloys is very important, as a low temperature generally results in an unsatisfactory surface appearance, and metal poured at improper temperatures is in the majority of instances found to be not satisfactory from the point of view of soundness. In addition, the shrinkage and fluid contraction of these alloy steels differs markedly from that of other steels. Because of these difficulties, much remains to be done in the foundries in developing proper technique for the production of 18 and 8 castings, and it is to a large extent true that each new pattern

as it comes in is a study in itself, and several castings frequently have to be made from each new design before a satisfactory product is secured.

This naturally has made the cost of production high, and also has made it difficult for the foundries to produce castings to the satisfaction of their customers, continued Mr. Hall. This is especially true because in many instances 18 and 8 and similar steels are specified for various valves and fittings formerly made of brasses and bronzes. The designers of these castings have not yet grasped the fact that a design which offers little difficulty to the brass foundryman, who pours his metal at a comparatively low temperature, may be, and frequently is, absolutely impossible to execute in these steels which have



to be poured exceedingly hot and which are very apt to contain shrinkage cavities in most unexpected places.

The most important problem now confronting makers and users of rustless steel valves and fittings is to reconcile the divergent views of the designer and the maker. At the present time the foundryman is constantly called upon to produce castings with complicated and widely varying sections, which simply can not be successfully executed in these steels.

Alloy Cast Iron Now Used in Pulp Industry

ALLOY cast irons can be used to advantage in paper mills to forestall damage arising from corrosion and to reduce breakage and wear of machinery, according to J. S. Vanick and F. L. LaQue of the International Nickel Co., New York.

In a paper entitled "Developments in Alloy Cast Iron for the Paper Industry," delivered Feb. 16 before the Technical Association of the Pulp and Paper Industry in New York, they stated that corrosion in acids, caustic, wash water and white water can be appreciably retarded by using improved compositions of cast iron containing nickel, copper and chromium in the pipes, pumps, parts, fittings,

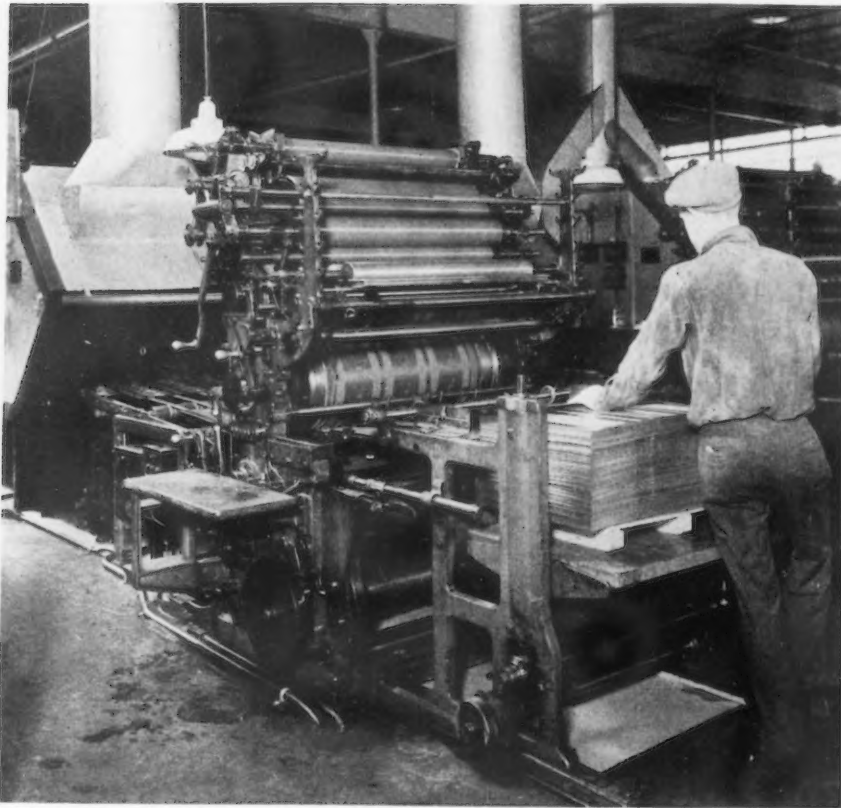
etc., that handle those liquids. Relief from troubles attending wear, cracking and breakage of dryer heads, rolls and calendars is likewise offered by properly balanced compositions of cast iron, they asserted.

Use and Care of Hoisting Chains

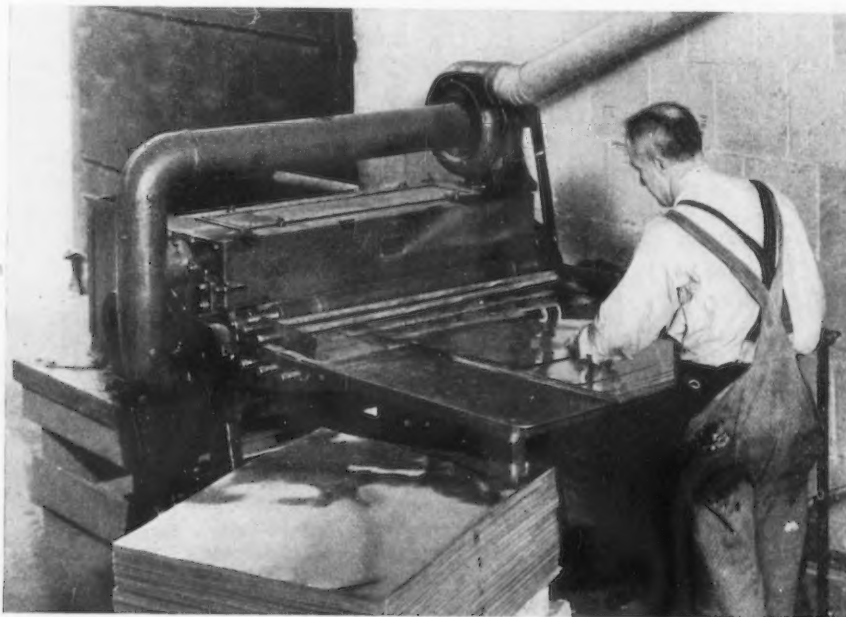
National Safety Council, Inc., has just issued an 8-page booklet containing valuable information on the use, care and inspection of hoisting chains. It will be sent free to any of our readers who wish it. Address the Council, at 20 North Wacker Drive, Chicago.

LITHOGRAPHING OPENS UP NEW SHEET OUTLET

By ROGERS A. FISKE



ROTARY presses imprint designs on tin plate, black sheets and aluminum sheets. The press speed is synchronized with the oven conveyor.
(Below) All sheets are cleaned by passing them between a series of small gas jets and then a group of buffing wheels.



NEW products, new applications of old products, outstanding workmanship and modern equipment were among the factors that made 1931 a record sales year for Caspers Tin Plate Co., Chicago. Another influence bearing on the management's performance was its policy of restricting the territorial scope of its trade to insure its customers prompt service.

Organized as a jobber of tin plate, this company recognized soon after its inception that the lithographing of sheet metals constituted a natural supplement to its business. Certain advantages favor this process on metals: Its cost for many applications in quantity production is less than either japanning or spraying with lacquer. Furthermore, it provides for metal containers a permanent label, definitely superior to a paper wrapper, which often fails to withstand first handling in packing.

Various problems, including use of proper materials, equipment and operating methods, confront the sheet metal lithographer. Important phases of these problems and the manner in which the Caspers company is dealing with them are here described.

Stock Must Be Suitable for Deep Drawing

The stock must be suitable for deep drawing operations. The coating which is applied to the metal must also withstand these machine operations. Duplication of a design on a sheet must be accurate to a thousandth of an inch, because in most instances sheets are fed through automatic presses and the design must coincide exactly with the spacing of the press feed. For example, a cap design, in several colors, has been reproduced 1100 times on a 20-in. x 28-in. sheet. The average number of reproductions on a sheet of this size is 80.

The lithographer must be equipped to send a sheet through a press as many as nine times and colors must register on the print with a variation not to exceed 0.002 in., or, as expressed by the trade, a hair line. He must be prepared to apply coatings and to lithograph on tin plate, black sheets and aluminum sheets, and he must reproduce colors with extreme accuracy for the reason that many

concerns are as particular about the color in a design as they are of the faithful reproduction of a trade mark.

Eighty Per Cent of Work Done on Tin Plate

About 80 per cent of the work done by the Caspers Tin Plate Co. is on tin plate for the reason that at present the field for food and commodity containers is well developed. However, the use of black sheets is steadily growing as the employment of lithographing expands in the field of advertising novelties.

One of the interesting pieces of equipment in use at this plant is a photocomposing machine, which is used for duplicating a design as many times as desired on a zinc plate and at the same time locating each copy of the design so that prints made from this zinc plate will match with subsequent punch press operations.

This is accomplished by making a photographic plate of the design to be reproduced. This plate is mounted vertically in a machine so that light will pass through the plate and register the design on a zinc plate which is coated with a photographic solution. This zinc plate is mounted on a carriage that can be moved horizontally and vertically past the plate. Each movement is controlled by a micrometer head so that the design as it is reproduced in both directions is accurately spaced to predetermined dimensions.

Sheets Cleaned Rapidly in Special Machine

The first step in handling sheets that are to be used in this plant is to clean them. This is done in a spe-

cial machine which cleans at the rate of 50 to 60 sheets a minute. A number of sheets are placed on the machine table and are fed one at a time between a number of rows of tiny gas jets. This cleans the surface by burning foreign matter and by vaporizing oil or moisture. Each sheet then passes between a number of buf-

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ALERT production managers are constantly on the lookout for new products or new outlets for old products. A Chicago company found that by lithographing metals it could capture a large trade among users of containers who had formerly used paper wrappers.

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ing wheels which tend to polish the surface.

In the main part of the plant are four coating machines and three lithographing presses. With this equipment sheets may be lithographed in many colors and sheets may be coated with paint, ink, or lacquer ranging from clear varnish to a varnish containing zinc pigment. Serving each press is a Young Brothers gas-fired oven. These ovens are in general of two types, the standard straight type and the humpback type. The humpback type is considered necessary for some kinds of coating work where it

is best to keep the freshly coated sheet in nearly a horizontal position for a few seconds of air drying to avoid the possibility of the coating forming beads or a ridge along the lower edge. One of the four coating ovens in this plant is 3 ft. 10 in. wide, 4 ft. 6 in. high and 76 ft. 6 3/4 in. long inside. The center-to-center sprocket distance is 86 ft. 3 in. The maximum size of sheet accommodated is 34 in. x 42 in. One of the three lithographing ovens measures 3 ft. 10 in. wide, 4 ft. 9 in. high and 38 ft. 10 in. long inside. The sprocket centers are 51 ft. 1 1/4 in. apart.

Lithographing Presses and Ovens Have Variable-Speed Motors

Each press is equipped with a variable speed motor and each oven chain conveyor is driven by the same type of motor. Separate motors for presses and conveyors are used so that a press can be shut down and the oven conveyors continue to move until all sheets have been cleared from the oven. The conveyors are of the finger type and they are so timed with the presses that a sheet is fed from a press to each finger on a conveyor. A sheet slides horizontally on a finger, but as the conveyor passes over the end sprocket the sheet is turned up to the vertical position which it retains during its passage through the oven.

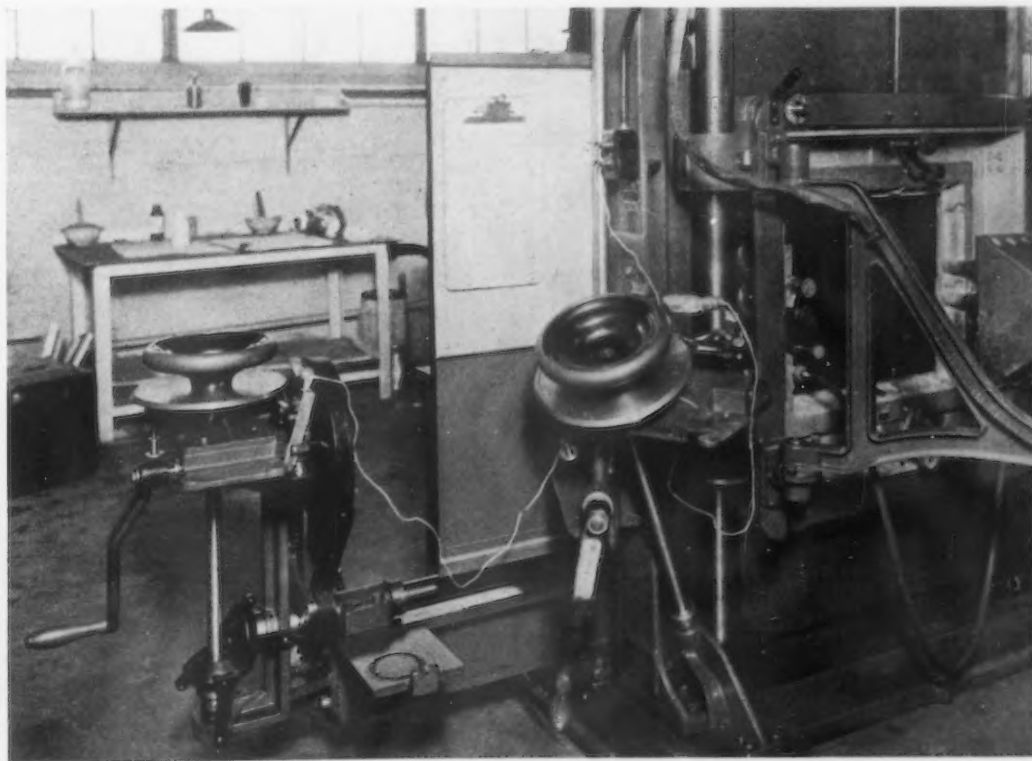
Vapors Removed by Ventilators

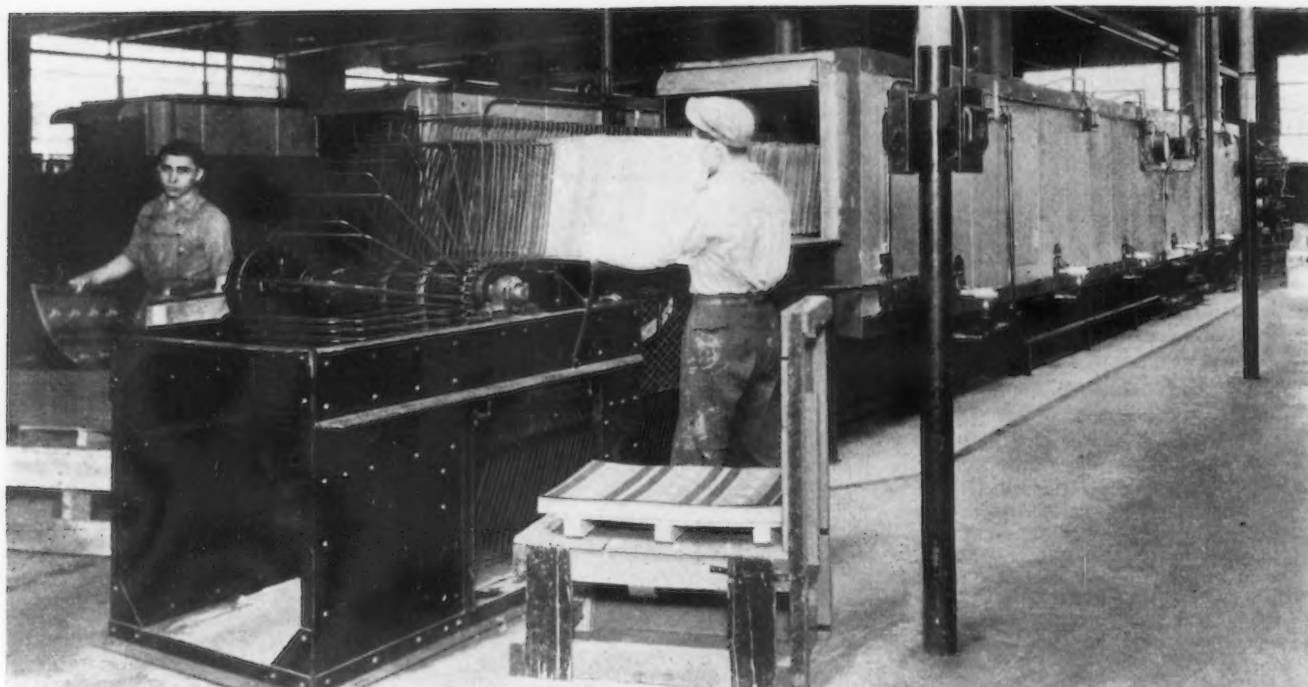
A ventilator is applied to the entering hood on each oven and at several points along the length of each oven are ventilating fans for the removal of vapors. Bristol Co. automatic temperature controls and recorders are located at three points in

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TWO index heads accurately control the horizontal and vertical movement of a sensitized zinc sheet on which a desired design is duplicated.

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Vertical fans (not visible) are located between the top and bottom runs of the conveyor and blow air through the top run, which is loaded with sheets from the oven.

each oven. Close control of temperature is imperative for first-class work. Temperatures range from 200 deg. to 450 deg. F. depending on the coating and the class of work.

Once a week a thermocouple is attached to a sheet which is run through the ovens. A Leeds & Northrup potentiometer is used to detect high and low temperature spots in each oven. Sometimes a loose sheet in an oven will tend to change the heating characteristics or a burner may need adjustment.

Sheets that have been lithographed pass through an oven in 7 to 9 min. and at the rate of 42 to 50 a minute. The baking time for coated sheets ranges from 18 to 30 min.

Cooling Space at End of Each Oven

The distance between sprocket centers is greater than the length of an oven. This arrangement affords a cooling space at the end of each oven. Between the conveyor runs at each cooling stand are several vertical motors with fan blades that blow air up

through the sheets to cool them further before they are lifted by hand from the conveyor.

Sheets that have defective coatings are boiled in a caustic solution, scrubbed and washed and so are reclaimed for use again.

All material is loaded on skids and is moved about the plant by electric trucks. Some skids are of special design for use in truck delivery to customers within economical trucking distance from the plant.

Arc Welding in Shipbuilding

MATERIAL procedure and technique has outstripped design in the application of arc welding to ship structures. This point was brought out by H. W. Pierce, assistant general foreman, hull department, New York Shipbuilding Co., Camden, N. J., in a paper read before the Society of Naval Architects and Marine Engineers in New York. Corresponding yard erection and production methods, general in application, have not yet been devised to make the most economical use of welding in ship work. Mr. Pierce described welding as "a fine tool, but, like all good tools, one which requires skill, common sense and experience to use properly."

Among the advantages he cited for fusion welding in general, and electric arc welding in particular, are the following:

1. Drafting is simplified appreciably by

elimination of much riveting detail, extending into loft.

2. Weight is reduced by elimination of flanges that are required only by riveting; more efficient use of material is therefore practicable.

3. Weight may be reduced further by joints designed to develop 100 per cent of plate strength, eliminating loss of section due to rivet holes.

4. Only one operation is necessary to secure connection and watertightness.

5. All kinds of attachments may be made to watertight structure without danger of leakage.

6. A single operation takes the place of punching, reaming, counter-sinking, riveting and caulking.

7. Corrosion resistance in recently developed materials is exceptional.

8. Inspection is made easy—the common conception to the contrary.

9. Maintenance costs are reduced by eliminating rivet replacement, oil and water leaks, etc.

10. Ship is more rigid, and creaking and groaning caused by slippage of riveted joints are lessened.

11. Appearance of ship when properly

finished is favorable—although this is admittedly a matter of personal opinion and custom.

Mr. Pierce made it plain that he does not advocate that welding can or should replace all riveting in ship construction. Welding for welding's sake, regardless of economics, is as absurd as the indiscriminate use of other tools or materials. For example, it is technically possible to build a ship completely of high-tensile or of corrosion-resisting steel.

The essential point is that welding is a good method, and that, in so far as the connection is concerned, it should be unquestioned, when properly designed and made in weldable material, as with riveting. Its use should be limited, therefore, not by criticism or bias against it as a method, where its value has been amply demonstrated, but by an economic consideration of each case.

Improved Hydraulic Platen Presses

Feature Flexibility and Speed

FURTHER improvements have been announced by the Hydraulic Press Mfg. Co., Mount Gilead, Ohio, in its line of "Hydro-Power" platen presses for deep drawing, forming, blanking, bending, coining, embossing and other stamping operations. The machines are motor driven and self-contained. A feature emphasized is that hydraulic flexibility has not been lost in stepping up the operating speed to obtain a practical production unit.

The oil pressure system employed provides ram rapid traverse to the work, a slower pressing speed and rapid return of the ram to the starting position. Operation may be full automatic, semi-automatic or manual, change from one method to another being made by means of electric switches without stopping the press. With full-automatic operation the complete cycle repeats itself continuously; when set for semi-automatic operation, the ram stops at the upper position after completing one cycle. With manual operation, movement of the ram in either direction is controlled by a single hand lever. In this case the ram can be stopped by placing the lever in neutral position; ram speed in either direction is pro-

portional to the distance the lever is moved from neutral. Full pressure stops attached to the strain rods protect the presses from overstroke. Power consumption when idle is practically zero, only sufficient pressure being maintained to balance the weight of the press ram and platen.

The radial pump with its electric motor drive is mounted on the press head directly behind the main cylinder, and an overhead tank holds the pressing fluid. The presses are obtainable in 11 pressure capacities from 100 to 2000 tons, each in three square platen sizes from 24 x 24 in. to 72 x 72 in.; also in open-side type, from 24 x 36 to 60 x 84 in.

Gear Chamferer Has New Work-Head Drive

A NEW work-head drive for its No. 3 Peerless chamfering machine has been developed by the City Machine & Tool Works, Dayton, Ohio. Instead of employing a combination geared-head reduction motor, this drive separates the reduction unit and the motor, permitting use of a standard motor which drives the reduction

unit through V-belts. With this arrangement it is possible to change the operating speed of the work-head to secure maximum results for each type of work. Below is shown mounting of new gear reduction unit and motor.

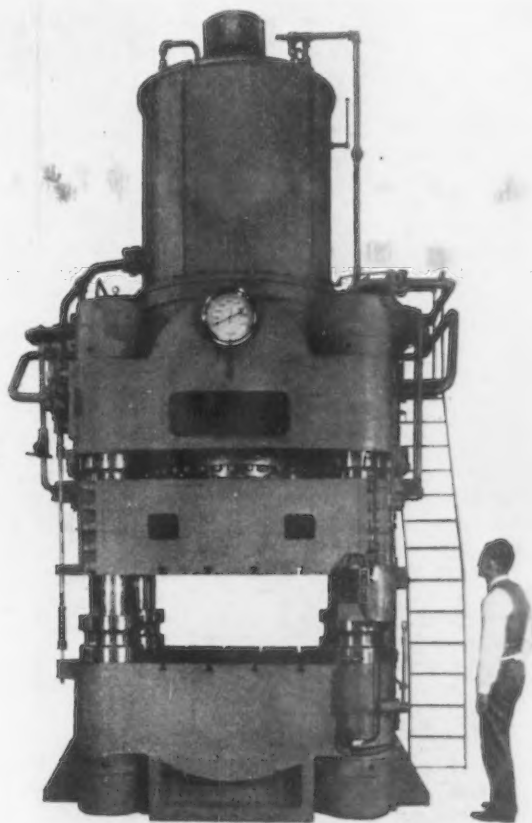
Induction Motors for Punch Presses

INDUCTION motors for use on punch presses and machinery with similar operating characteristics have been announced by the Reliance Electric & Engineering Co., Cleveland. Sizes range from $\frac{1}{4}$ to 200 hp. Advantages claimed include lower installation and operating costs and considerably improved power factor. It is stated that a much smaller motor can be used, saving power.

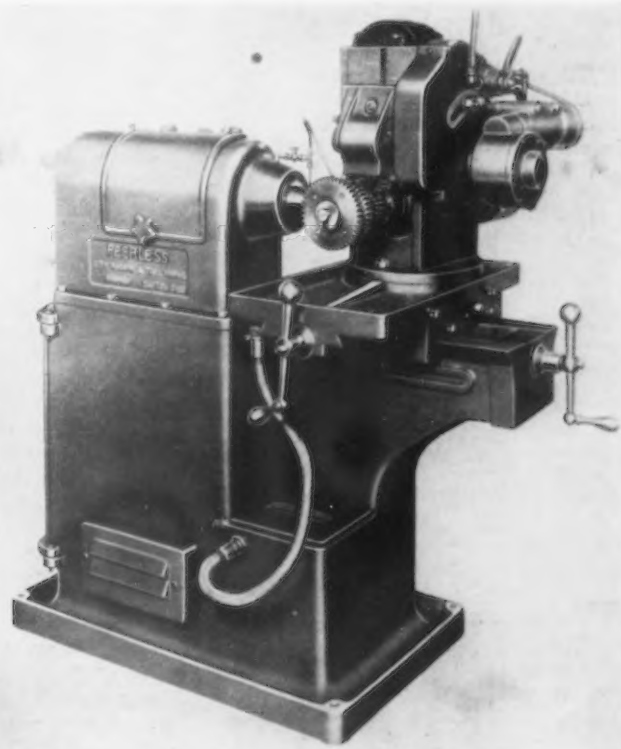
In the design of these motors the flywheel with which all punch presses are equipped was especially considered. During the unproductive part of the operating cycle they deliver power to the flywheel. When work is being done they slip and permit the flywheel to carry brunt of load.

These motors develop a starting torque of approximately 225 per cent and have a slip of 8 to 12 per cent. Normal starting current is required.

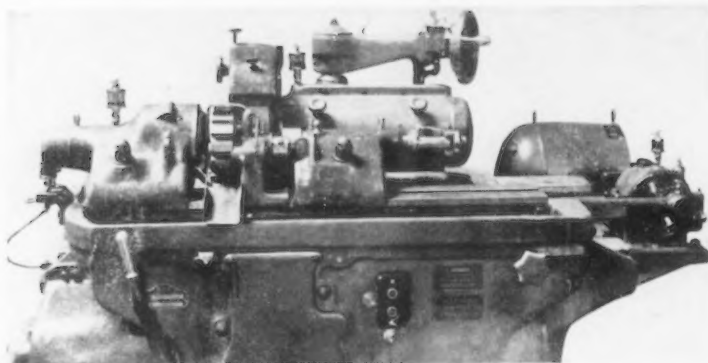
The frame is of welded steel. These motors may have ball or sleeve bearings and may be obtained either in open, fully-enclosed or fully-enclosed fan-cooled construction.



CHANGE-OVER from full-automatic, semi-automatic or manual operation is accomplished through two small electric switches.



IN the new workhead drive for the chamfering machine shown above, the motor is separate from the reduction unit, permitting use of standard motors which drive the reduction by means of V-belts. With this arrangement, which is optional, workhead speeds may also be changed to suit the work.



THE operator merely loads the work turret. The finished valve tappet stems drop from the turret into a chute, which carries them to the front of the machine. Production is at the rate of 40 to 50 pieces per min.

Small Ground Parts Polished Automatically

IN recognition of the trend toward employment of a polishing operation after finish grinding, the Landis Tool Co., Waynesboro, Pa., has developed a fully-automatic polishing machine for use on valve tappets and a variety of other small parts.

Valve tappet stems are polished on the machine illustrated at the rate of 40 to 50 a minute, removing about 0.0002 in. of stock. The operator does nothing but place the valve stems in

the work-holding turret, reciprocation of the wheel carriage, indexing of the work turret and movement of the footstock spindle taking place automatically at the correct point in the polishing cycle.

The work is driven by friction. Each piece after being polished drops from the turret to a chute which delivers it at the front of the machine. A felt wheel, the face of which is loaded with polishing medium, is employed. Dust is carried away by an exhaust system. For the base of the machine the base of a small plain Landis grinder is utilized.

Pendant-Type Push Button Stations

THE new line of pendant-type, momentary-contact type CR-2940 push button stations announced by the General Electric Co. is designed pri-

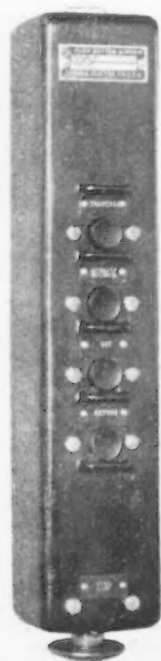
marily for the control of motors driving machine tools. The stations may be fitted with sufficient cable so that they can readily be carried around by the operator.

The momentary-contact push-button unit provides both a normally-open and a normally-closed circuit. The movable contact is a silver-plated disk normally held against the two top contacts by a spring. When the button is depressed, this circuit is broken and the circuit across the two bottom contacts is made. The units are mounted on the front of the case by means of screws, and are adaptable for mounting on the back of any cover-plate or may be built into a machine.

The inclosing cases are made of cast-aluminum alloy and have a black japan finish. Rounded corners make the case easy to grip and hold in the hand. The entire back of the case is removable, permitting access to all of the units for wiring or inspection. Ample space is provided along both sides of the units for all necessary control wires.

All of the buttons except the "stop" button are protected from accidental operation by means of a guard at the bottom of the button. A nameplate indicates the function of each button.

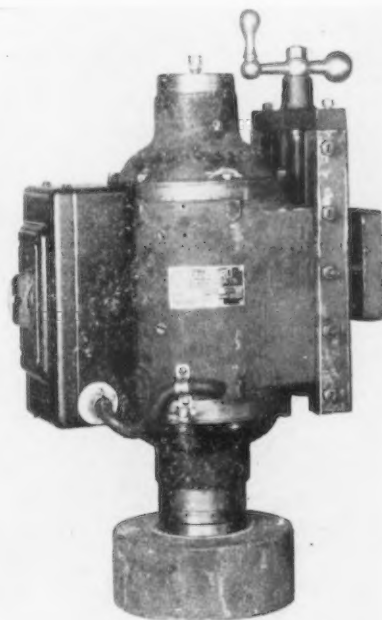
The "stop" button, mounted on the bottom of the case, has a mushroom head which makes the button easily accessible in case of emergency.



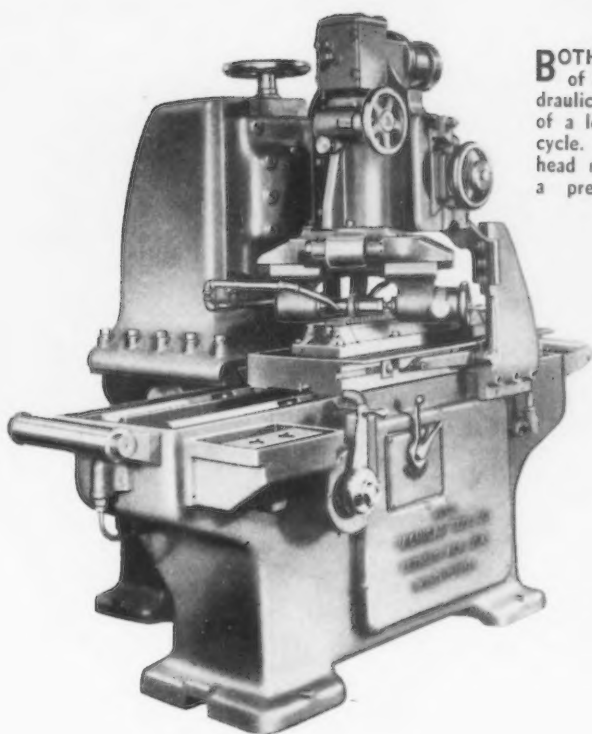
Vertical Grinder for Planers and Boring Mills

FOR use in grinding dies and for surface grinding on planers and boring mills, the Standard Electrical Tool Co., Cincinnati, has brought out the vertical grinder, illustrated, which is made in sizes ranging from 3 to 10 hp.

The particular machine shown has a special 4-hp. 3600-r.p.m. General Electric motor which is controlled by a switch on the housing. S.K.F. ball bearings are used and a special bearing is provided to take end thrust. A pad is provided on the vertical feed for attaching the grinder to a planer or other machine tool. The machine can be furnished also with both horizontal and vertical feeds. A 7-in. diameter cup wheel is regular equipment. The net weight of the machine is 155 lb.

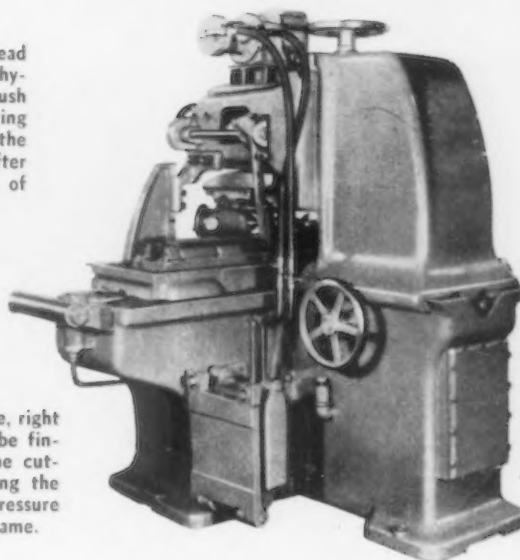


This machine is adapted for grinding dies as well as for surface grinding on planers and boring mills.



BOTH the table and the head of this gear finisher are hydraulically actuated. One push of a lever starts the operating cycle. The table stops and the head raises automatically after a predetermined number of table strokes.

ANY helix angle, right or left, can be finished on the same cutting rack, providing the pitch and the pressure angle are the same.



Hydraulically-Operated Gear Finishing Machine

A GEAR finishing machine completely controlled by an Oilgear hydraulic unit has been put on the market by the Michigan Tool Co., Detroit. High pressure is used for the power on the table travel; a low pressure cylinder mounted on top of the head raises and lowers the head of the machine and locks the machine to the correct finishing dimension while the gear is finished.

Operation of the machine is controlled by a single handle. The operator mounts the gear on an arbor or on centers, if centers are provided in the shaft. One push of the lever starts the table to travel automatically, the head coming down to the predetermined position. After the table makes the number of strokes desired (ranging from 1 to 50), the head automatically raises and the table stops, so that the operator may remove the finished gear and insert another one. In case two arbors are used, one being loaded while the other is holding a gear for the finishing operation, there is a place on the side of the machine to hold the arbor and drain the dripping oil into the oil tank.

On a gear with a 1-in. face, the amount of stock which should be left for the finishing operation is from 0.005 to 0.010 in. on the tooth thickness. However, the closer this is controlled and the less stock left, the less number of strokes are necessary to complete the work. The head of the machine is fed into the gear under a certain pressure so that if a

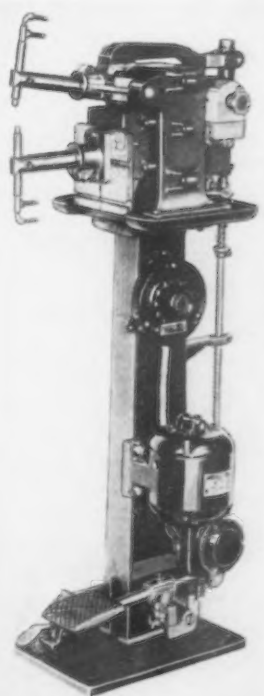
gear mounted in the machine has an excessive amount of stock, the cutting rack will not break or the machine stall.

Any helix angle, right or left, can be finished on the same cutting rack, providing the pitch and pressure angle are the same. The head of the ma-

chine can be set either right or left to 55 deg. helix angle.

In cluster gears or gears of that nature, where the diameters are different and the gears spaced close together (approximately $\frac{3}{8}$ in. apart), a special rack must be built. However, if they are 1 in. or more apart, even though the diameters vary, they can be finished on the standard cutting rack.

The production time of a 28-tooth, 10-pitch gear, with 40-deg. helix angle and $\frac{3}{4}$ -in. face and 0.004 in. to 0.008 in. stock on the tooth thickness, is 60 per hr., or 1 per min. The limits on these gears are eccentricity, 0.0015 in.; on involute, 0.0002 in.; helix angle, 0.0002 in.; spacing from tooth to tooth, 0.0002 in., with at least 85 per cent of full contact of the tooth form.



Spot Welders Provided with Variety of Speeds

RAPID production on small parts, and positive, smooth action are claimed for the series M motor-driven spot welders recently brought out by the Eisler Electric Corp., 740 South Street, Newark, N. J. They are equipped with variable-speed reduction geared-head motors, enabling the operator to make from 30 to 100 welds a minute in graduated steps. Timing is automatic and is maintained constant at all speeds. A wide range of heating steps is provided. A variable current regulator controls the heat of the weld and the pressure can be varied by means of an adjusting nut.

This series is offered in six sizes, $\frac{1}{2}$, 1, 3, 5, 10, 20 and 35 kva. and combined thicknesses from 0.0005 to $\frac{5}{8}$ in. can be welded. The machines are suitable for use in the manufacture of radio tubes, incandescent lamps and sheet metal parts.

New Facts Disclosed Regarding Rustless and High-Speed Steels and Inclusions in Castings

DESPITE predictions that the attendance this year at the one hundred and forty-first meeting of the American Institute of Mining and Metallurgical Engineers would fall off 10 to 15 per cent from 1931, the contrary was true. At the four-day convention last week, Feb. 15 to 19, in New York at the Engineering Societies Building, the registration of about 1400 was practically the same as a year ago. The event was highly successful and demonstrates that the depression has not dampened the desire for the high-grade technical information which this organization always offers.

Besides the usual sessions on petroleum, coal, mining, geology and so on, there were the regular programs of the iron and steel and the Institute of Metals divisions of the institute. These drew a large attendance of metallurgists.

At the four sessions of the steel division 13 papers were presented covering such main topics as high-speed steel, rustless steels, steel rails, open-hearth practice, the blast furnace, and miscellaneous topics. There were 15 papers scheduled for the four sessions of the institute of metals, with discussions of aluminum, brass, copper, lead and precious metals predominating. Of special interest was one on copper-beryllium bronzes which presented some late developments in the use of beryllium.

A Symposium on Gases in Metals

A feature of the convention was a symposium on gases in metals in the preparation of which many weeks of organized effort were involved. There were nine papers devoted to this, embracing such problems as the solubility of gases in metals; the degassing of metals; determination of oxygen, nitrogen and hydrogen in steel; gases in copper, and the influence of gases in metals. Considerable interest was displayed in a paper, "Inclusions—Their Effect, Solubility and Control in Cast Steel" which was quite freely discussed. Unfortunately discussion of most of the papers was meager.

Two Notable Lectures

The two annual lectures, always a feature of this convention, were of a high order. The Howe Memorial lecture was delivered by Edgar C. Bain on "The Rates of Metallurgical Reactions in Solid Steel" Mr. Bain is research metallurgist, United States Steel Corp'n. Research Laboratory, Kearny, N. J. The Institute of

Metals lecture was delivered by Dr. Paul D. Merica, vice-president, International Nickel Co., New York. His topic was "The Age-Hardening of Metals."

Mr. Bain discussed those changes in constitution which occur as a result of change in temperature, in terms of their rates and mechanisms. Particular emphasis was placed on the influence of two important alloying elements—manganese and nickel—in changing the rates of the reactions. Structures resulting from the various transformations were correlated on the basis of the temperatures maintained during the reactions and the alloying element present.

Dr. Merica in his lecture pointed out that industry today, in its manifold engineering and scientific developments, requires materials of novel and diverse character—and it calls on the chemist, the physicist and the metallurgist to produce them. He discussed certain developments in the metallurgy of alloys, particularly the "dispersion hardening" of metals and alloys, which illustrate the manner in which metals are today being adapted to modern engineering needs. Certain non-ferrous metals and alloys are now being transformed by dispersion treatment so as to be equal in some physical properties to many of the steels.

At the usual dinner of the Institute of Metals division, held Tuesday eve-

ning, Feb. 16 at Hotel Commodore, Sam Tour, chairman, stated that this was the twenty-fifth anniversary of the founding of the organization from which the institute originated and also that this year's lecture by Dr. Merica came on the tenth anniversary of the founding of the course.

Following a custom recently inaugurated, namely, an address at the dinner on some metal familiar to industry, the subject this year was "Magnesium" and the speaker was Dr. J. A. Gann, chief metallurgist, the Dow Chemical Co., Midland, Mich. He traced the pioneering in this field and outlined the difficulties encountered in the solving of the many problems involved in the successful commercial production of magnesium.

At the annual meeting the election of new officers was announced. Scott Turner, who was made president, is director of the United States Bureau of Mines. Two vice-presidents and five directors were named, as given in an adjoining column. A. B. Parsons, who was appointed to fill out the vacancy caused by the resignation of H. Foster Bain last fall, is the secretary. It was stated that the institute's deficit for 1931 was \$2,931.

Chief Topics at Steel Sessions

TECHNICAL interest in the program of the iron and steel division centered in three special topics: High-speed steel, rustless steels, and inclusions in steel castings. One session was devoted to the rustless steels.

New Facts About High-Speed Steel

That there is keen interest in the rather old subject of high-speed steel was demonstrated by the reception given to the paper "Vanadium in High-Speed Steel" by A. B. Kinzel and C. O. Burgess of the Union Carbide and Carbon Research Laboratories, Long Island City, N. Y. The major portion of this paper is found on other pages.

In discussing this paper Dr. John A. Mathews, vice-president, Crucible Steel Co. of America, reported that he had found that some of the high-vanadium types of steel, described by Mr. Kinzel, are forgeable, confirming the authors' results. Microscopic examination has also revealed the fine distribution of the carbide, pointed out in the paper. Mr. Mathews had discovered, however, that this composition will not take quite as high a hardening temperature as the 18-4-1 steel. The reason why no

New Officers

President: Scott Turner, director, United States Bureau of Mines, Washington.

Vice-President: Dr. F. M. Becket, vice-president, Union Carbide & Carbon Co., New York.

Vice-President: Dr. Paul D. Merica, vice-president, International Nickel Co., New York.

Directors: Erle V. Daveler, Nevada Consolidated Copper Co., New York; Eugene McAuliffe, Union Pacific Coal Co., Omaha, Neb.; H. S. Mudd, Los Angeles, Cal.; J. B. Umpleby, geological engineer, Norman, Okla.; Charles G. Whittier, consulting engineer, R. W. Hunt & Co., Chicago.



SCOTT TURNER



A. B. PARSONS



E. C. BAIN



P. D. MERICA

Reading from left to right: Mr. Turner and Mr. Parsons are respectively the institute's new president and secretary. Mr. Bain and Dr. Merica were the two lecturers.

more than 1 per cent vanadium had been introduced years ago was that it then cost \$15 per lb.

J. V. Emmons, metallurgist, Cleveland Twist Drill Co., Cleveland, also confirmed some of the authors' results and characterized the paper as a fine contribution. He was in general agreement with the recommendation of the authors as to the ratio of increase in carbon and vanadium.

W. H. Keen, Latrobe Electric Steel Co., called attention to a 2.5 per cent vanadium high-speed steel his company has been making on a large scale for some time. In his opinion, one cannot go below 0.75 per cent carbon in such steels and high carbon is necessary with increased vanadium content.

At the session on rustless steels, three papers were presented. Brief abstracts, with some of the discussion, are given in the following paragraphs.

Preventing Intergranular Corrosion

A problem of vital interest to users and producers of the rustless steels was dealt with in a paper, "Prevention of Intergranular Corrosion in Corrosion-Resistant Chromium-Nickel Steels." The author was P. Payson, research department, Crucible Steel Co. of America, Harrison, N. J.

Intergranular corrosion, according to Mr. Payson, is of importance, first, in welded structures which are to be in contact with electrolytes at low temperatures, and second in structures that may be exposed to active electrolytes after being subjected for a considerable period to elevated temperatures of 1000° to 1600° deg. F. "The present work deals mainly with the effect of short-time heating over the range, 1000° to 1600° deg. F., such as might be encountered in the heating of the metal adjacent to the weld during the welding operation."

A large number of modifications of the 18 and 8 type of rustless steel were made by Mr. Payson for the purpose of obtaining compositions containing an appreciable amount of ferrite. It was found early in the author's work that the addition of some elements in sufficient quantities to develop ferrite in the steel, when rapidly cooled from 1850° to 2100° deg. F., made the steel highly resistant to intergranular attack. He found that by adding to the standard 18 and 8 steel enough silicon, molybdenum, vanadium or other elements, the development of a two-phase structure, austenite and ferrite, resulted. The effect of each element—chromium, tungsten, molybdenum, vanadium, silicon, and titanium—is discussed in some detail, as well as the experimental data.

The Ferrite Hypothesis

An important conclusion of Mr. Payson's work is that the chromium-nickel corrosion-resistant steels can be made to contain two phases, austenite and ferrite, by adding elements like silicon and molybdenum, and that the two-phase steels are much more resistant to intergranular attack than the single-phase austenitic steels. The function of the ferrite in these two-phase alloys in regard to prevention of intergranular corrosion seems to be to provide a place for carbides to precipitate other than in a concentrated form along austenite grain boundaries. This is the author's ferrite hypothesis. The explanation of the type of attack referred to is still not quite clear, said Mr. Payson, and he took some exceptions to the prevailing theories.

Discussion of this paper was led by Dr. John A. Mathews, who was chairman of the session. He said, in part, that the tendency to intergranular corrosion in austenitic chromium-nickel corrosion-resistant steels has

been the chief retarding influence in limiting their use for chemical plant and similar structures where the welding process is involved and where size limitations prevent the possibility of heat treatment after welding. Mr. Payson's paper deals primarily with the cure for the cause of this phenomenon.

Complexity of This Steel's Metallurgy Now Revealed

"It is hard to believe that only six years ago we thought that the metallurgy of austenitic steels was simplicity itself as compared with ordinary steels, but the evidence in that time has disabused our minds on this score," commented Dr. Mathews. "Now Mr. Payson proposes to add delta iron metallurgy, which will be something of great value when better understood."

"The elements which Mr. Payson has employed to bring about high resistance to intergranular attack have been introduced by others with more or less satisfactory results. No one, so far as I know, has connected their presence with their ability to produce a certain amount of delta ferrite. It is a question of balancing the entire composition to produce this result rather than merely adding a new element to such steels," said Dr. Mathews.

Dr. Mathews said that it is too early to evaluate the practical importance of this work, but he anticipates that it will be very great. Much remains to be done to establish exact limits of composition which give maximum resistance to such corrosion. It must also be remembered, he pointed out, that some of these steels may not be readily fabricated in all forms demanded, and also that they will represent a considerable difference in cost and the specific influence of the special added element
(Concluded on page 535)

SHORT SELLING OF SECURITIES—A

By FORREST E. CARDULLO

SECURITY prices are fixed by sale and purchase on stock exchanges. A stock exchange is in effect a continuous and nation-wide security auction. It is so organized as to offer every facility for quick sale and purchase. It exercises a beneficial function in that it establishes for each security a fair price based on a nation-wide supply and demand. It has also a baneful influence because it lends itself to the promotion of gambling. Stock exchange operations are so intimately connected with business and finance, and therefore with industry, that the rules and customs of the exchanges, and the use or misuse of the facilities of the exchange, are matters of immense importance to the public welfare, and are therefore just as properly subject to Governmental regulation as are the operations of banks or railroads.

Three Kinds of Security Purchases

There are three different kinds of purchases of securities. The first is purchase for investment, where the purchaser expects an annual return on his investment, and the eventual return of the principal. The second is purchase for speculation, where the purchaser expects that the securities purchased will increase in value and eventually produce a high rate of return because of the growth of business, the development of a new industry, or for some similar reason. In a true speculation, the speculator expects to hold the securities indefinitely, exactly as he would in an investment. A third type of security buying

commonly called speculation, is gambling pure and simple. In order to distinguish this type of security buying from true speculation, I will hereafter designate it as gambling, and the buyer as a gambler. The gambler purchases a security with the intention of shortly selling it again at an increased price, the increased price having nothing whatever to do with the intrinsic value of the security.

Investment buying is done by savings banks, insurance companies, trustees, and individuals, for the purpose of procuring an income, or for the purpose of accumulating a sinking fund against some future contingency. It is frequently done in order to employ the idle surplus of an industry which cannot be profitably expanded. Investments form the backlog of our entire financial structure, and every effort ought to be made to make them as secure in principal and as dependable in return as possible. It is sometimes necessary to realize on an investment because of the need of money. It is therefore highly desirable that the prices of investment securities should fluctuate as little as possible, and that such fluctuations should be in the nature of a gradual, slow increase in price due to a gradual and slow reduction in interest rates, which naturally comes about when savings accumulate at a faster rate than is needful to meet the demand for new capital at the current interest rate.

Price Swings and Investment Securities

The effect of changes in the price level on investment securities, is altogether unfortunate. A rising price level is usually associated with an interest rate higher than normal, which tends to depress the price of investment securities. It also tends to withdraw funds from investment securities to speculative securities, thereby depressing their price. On the other hand, falling prices are usually associated with a falling interest rate, which would normally increase the price of investment securities. However, falling prices usually force the liquidation of all kinds of securities, and this forced liquidation of investment securities depresses their price. Investment securities rise in price during a period of stationary commodity prices, especially after a

Wall Street and Business—

EVER since the stock market crash there has been a consistent effort to absolve Wall Street of blame for our economic tribulations. But men who have dedicated their lives to production are not satisfied with ex parte arguments and are making their own investigation of the securities market and its relation to general business.

The author of this article, who is chief engineer of the G. A. Gray Co., Cincinnati, refuses to accept the view that Wall Street professionals are alone qualified to speak authoritatively on this subject, pointing out that they are after all interested parties. He severely condemns the economic school that rises to the defense of all business practices

period of falling commodity prices. Variations in the price of such securities perform no useful economic function and frequently impose severe strains on our economic structure.

Not all changes in the value of investment securities occur as a direct result of variations in the commodity price level. The value of all such securities is based on the power of taxation or on the earning power of some business organization. The value of a railroad bond depends very largely on the earning power of the road. If economic conditions so change as to render the railroad valueless, the value of the bond practically vanishes, and its price drops to its share of the salvage value of the road. Such changes in value, however, are properly taken care of by diversified investments, and by care in the selection of investments in the first place.

Investment securities usually differ from speculative securities by the fact that in the given company the investment securities are a prior lien on the earnings and assets of the company, and the returns are limited. If the company does well, the returns on the speculative securities, usually in



A MENACE TO LEGITIMATE BUSINESS

An Engineer's Analysis

which are within the law, and boldly attacks stock market "gambling" as a destructive business influence. He makes a strong case for the abolition of short selling, and offers specific suggestions as to how this can be accomplished.

Emergencies have a way of forcing needed reforms, and it is worthy of note that the cogency of Mr. Cardullo's conclusions has finally been tacitly acknowledged by the very interests that have been most conspicuous in defense of short selling. A drastic curb has been put on short selling by a new rule, effective April 1, under which members of the New York Stock Exchange are required to obtain express consent from customers before lending their stocks.

the form of common stock, are large, while the returns on the investment securities, usually in the form of bonds or preferred stock, are relatively small. On the other hand, in lean years (usually during a period of falling prices), when the company loses money, speculative securities pay nothing, and the returns on investment securities are paid out of surplus. The entire loss is borne by the speculative security until its value has vanished completely, and only then does the real loss on the investment security begin. However, the prices of investment securities move in sympathy with the prices of the speculative securities of the same company, since investors are apprehensive that they will incur a loss.

Variations in the price of speculative securities have in general the same objectionable results as variations in the price of investment securities, but the effects on our financial structure are not so serious. Individual speculative securities necessarily vary considerably in price, in accordance with the probable long-term earnings of the corporations which have issued them. However,

the actual price variations which occur in speculative securities are far greater than can reasonably be expected from actual or probable variations in value, and whenever these violent variations are permitted or promoted by the rules and customs of stock exchanges or stock traders, it is the duty of our law-making bodies to alter these rules and customs for the public good.

The buying and selling of securities of any kind where the purchaser expects to hold the securities for only a short time, in the expectation of an advance in price, is neither investment nor speculation, but is gambling. The difference between gambling and speculation does not lie in the element of risk, nor in the degree of risk, but in the fact that speculation performs a useful economic function in the promotion of industrial or other enterprises, while gambling has no such useful function. The man who buys a thousand shares of General Electric stock on Tuesday, in the expectation that it will advance two points by Friday, is not promoting the welfare of the General Electric Co., nor is he benefiting the man from whom he purchased the stock, nor is he benefiting the man to whom he sells the stock. If he had kept out of the transaction entirely, the seller would probably have received a dollar more per share, and the buyer would probably have purchased the shares for a dollar less.

When the gambler wishes to buy, he uses every influence he can to depress the price of the securities, and when he wishes to sell he uses his utmost efforts to increase the price of the securities. The usual method of doing this is by spreading false or exaggerated information, at one time to the detriment, and at the other time to the advantage, of the company whose shares he seeks to influence. The net effect of stock gambling is bad. The gambler makes his profit by swindling the investing public either by the dissemination of false information, or by suppressing or distorting the truth. There is no other possible way by which he can make money, and he serves no beneficial economic function. He buys and sells securities, but he is not a legitimate securities merchant. No mercantile house operating with such a system of ethics would survive for a year. He

is only enabled to operate because his dealings are concealed by the anonymity of the Stock Exchange. From both an economic and ethical standpoint, his operations are more harmful than those of a bucket shop.

Short Selling Is Pernicious

Of all forms of stock gambling short selling is the most harmful. It is the contention of many economists that short selling has a beneficial place in our financial system. There is a school of economic thought whose method of reasoning is that all legal business practices are of economic benefit, and this school will stretch reason till it cracks to prove that accepted business practices are correct. Such economists commonly defend short selling on the ground that it tends to prevent undue inflation of prices.

In the case of stocks the argument runs something like this: When a certain stock is selling for more than it is worth, the short seller will offer it for sale, thus preventing the price from rising unduly. At a later time when the stock is selling for less than it is worth, the short seller buys it for delivery, and thus prevents an extreme depression in price.

As a matter of fact, in a bull market the short seller does everything that he can to inflate the price of the stock which he expects to sell, and when the stock is falling in price he does everything he can to depress it still further. Instead of performing a useful economic function his efforts are entirely harmful. He encourages

(Concluded on advertising page 22)



California Industry Favors Law Barring Uneconomic Practices

Advocates Nye Bill—Market Research Suggested as Means to Develop Coast Iron and Steel Business

THE eighth annual conference of the iron, steel and allied industries of the California State Chamber of Commerce was held at Del Monte, Cal., on Feb. 11, 12 and 13. A resolution was adopted indorsing the Nye bill, now in Congress, for the amendment of the anti-trust and Federal Trade Commission laws which would permit organized industry and trade to enter into agreements to eliminate uneconomic practices.

Another resolution favored the rotation of work in the present emergency to provide employment for the largest number of workers.

The conference also went on record in opposition to the growing tendency among governmental bodies to do public construction work by the day-labor method, and it was urged that competitive bids be taken and that such work be done on contract, with protection of the public through surety bonds.

Market research was advocated so that the iron and steel industry of California may be developed. It was proposed that proper fact-finding activities be instituted as a prelude to trade promotional plans.

About 175 were registered at the meeting, and of these about 100 were from Los Angeles. R. M. Alvord, Pacific Coast manager for the General Electric Co., was unable to preside at all of the sessions on account of illness, and Emil Jungquist, Percival Steel & Supply Co., Los Angeles, the vice-chairman, presided in his absence. It was decided to hold the 1933 meeting on Feb. 9, 10 and 11 at Del Monte.

Advocates One-Price Policy

Charles F. Abbott, executive director of the American Institute of Steel Construction, was one of the speakers at the conference. A résumé of Mr. Abbott's remarks was published in last week's issue of THE IRON AGE. He particularly stressed the importance of a single-price policy and a properly directed educational advertising campaign to make the public steel conscious and to develop new markets for steel.

E. F. Watkins, manager of purchases and stores, Southern California Edison Co., Los Angeles, read a paper on "Buying and Selling for Profit," in which he assailed the "business dynamiter," the man or organization, that continues to sell at a price below that which allows a fair spread for overhead and profit. He said that purchasing agents are opposed to such ruinous selling, which is responsible,

he said, for the growing chaos in industry. Mr. Watkins added that such a condition is prevalent on the Pacific Coast now. He said that purchasers do not object to a regulated price, if conditions of control are justified and if the price is fair.

Dr. Paul Cadman, former member of the faculty of the University of California and now executive secretary of the San Francisco Stock Exchange, presented a paper on "The Steel Industry and the Reconstruction of American Business," in which his conclusion was that "the principal domestic problem which the steel industry faces, in the opinion of a layman observer, is the necessity for new markets."

"Fifty per cent of businesses change their personnel every five years," said Edgar Kobak, vice-president, McGraw-Hill Publishing Co., New York. His observation was that times of readjustment offer a particular opportunity to small companies and to men who are not bound by tradition, prejudice or methods of the past. He pointed out the necessity of sales and

market analysis, of restoring confidence within each organization as a prelude to its advancement, and of anticipating future developments.

New Chairmen Appointed

The following chairmen of group committees, with General Chairman Alvord, Vice-Chairman Jungquist and Secretary Charles S. Knight, director of the industrial department of the California State Chamber of Commerce, form the executive committee of the conference the coming year:

Manufacturers: R. H. Petillon, Western Pipe & Steel Co., San Francisco; W. A. De Ridder, General Metals Corp., Los Angeles.

Reinforcing steel dealers: Charles M. Gunn, Gunn, Carle & Co., San Francisco; N. E. Dawson, Soule Steel Co., Los Angeles.

Merchant steel dealers: S. S. Barrows, Dunham, Carrigan & Hayden Co., San Francisco; Hugh Oliphant, Tay-Holbrook, Inc., San Francisco; E. Jungquist, Percival Steel & Supply Co., Los Angeles.

Steel mills: Wm. A. Ross, Columbia Steel Co., San Francisco; Arnold Foster, Pacific Coast Steel Corp., San Francisco.

Structural shops: Charles E. Spencer, McClintic-Marshall Corp., San Francisco; John McCone, Consolidated Steel Co., Los Angeles.

Foundries: E. Welch, American Manganes Steel Co., San Francisco; Wendall Kinney, Kinney Iron Works, Los Angeles.

Traffic: H. J. Bennett, Columbia Steel Co., San Francisco; T. A. L. Loretz, Consolidated Steel Co., Los Angeles.

Purchasing agents: E. W. Lindman, American Brake Shoe Foundry Co., San Francisco; E. F. Watkins, Southern California Edison Co., Los Angeles.

Carnegie Steel Co. Acquires Plant Site

The Carnegie Steel Co., Pittsburgh, has acquired the plant site of the American Steel & Wire Co. at Brad-dock, Pa., adjacent to the former company's Edgar Thomson works. No definite plans for the tract have been formulated, according to Carnegie company officials, although the old buildings on the site are being dismantled.

New Engineering Cooperation

The Cincinnati Milling Machine Co. and its subsidiary, Cincinnati Grinders, Inc., Cincinnati, and the Heald Machine Co., Worcester, Mass., have concluded a cooperative arrangement which will be mutually advantageous in the further development of their respective lines of manufacture.

These companies have for years made many valuable contributions to the industries they serve and they believe that by making the engineering research and grinding knowledge of each company available to the engineers of the others a more complete service in internal and external grinding can be rendered to all users.

Sheet Production Gained 17 Per Cent. in January

Sales of steel sheets by independent manufacturers increased more than 21 per cent in January over December and production gained 17 per cent, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers. There was also an increase in shipments and unfilled orders. It was the second month during which shipments increased.

Sales in January were 121,258 net tons, compared with 99,706 tons in December. Production gained from 101,570 tons in December to 118,921 tons last month. Shipments were 112,971 tons as against 103,400 tons the previous month.

The January report and comparison in net tons follows:

	Jan.	Dec.	Nov.
Sales	121,258	99,706	102,867
Production	118,921	101,570	102,758
Shipments	112,971	103,400	94,975
Unfilled orders.....	126,508	119,677	147,169
Unshipped orders.....	45,748	46,349	58,533
Unsold stocks.....	73,540	80,191	74,763
Capacity per month.....	555,000	559,000	559,000
Percentage reporting..	68.7	68.9	68.9
Percentages, Based on Capacity			
Sales	31.8	25.9	26.7
Production	31.2	26.3	26.7
Shipments	29.6	26.8	24.6
Unfilled orders.....	33.2	31.0	38.2
Unshipped orders.....	12.0	12.0	15.2
Unsold stocks.....	19.3	20.8	19.4

Stabilized Rail Price Again Discussed in Washington

Subject Comes Up in Hearings on Ownership of Railroads by Industries—Steel Corporation Roads Particularly Mentioned



WASHINGTON, Feb. 23.—Reports that the present session of Congress will enact legislation applying to industrial railroads apparently are without substance. The reports were to the effect that the legislation would be included in the program proposed by the Interstate Commerce Commission. The House Committee on Interstate and Foreign Commerce has taken extensive testimony from members of the commission, railroad representatives and others preparatory to drafting legislation. Two of the highlights included in the commission's program call for repeal of the recapture clause and for commission control of railroad holding companies.

Legislation covering industrial railroads is favored by at least some members of the commission, but it is evident before making a specific proposal as to its nature the commission will await the outcome of a test case referred by it to the Department of Justice. This concerns the so-called commodities clause in the case of the Elgin, Joliet & Eastern Railroad, which is controlled by the United States Steel Corp'n. This clause, a part of the Interstate Commerce act, provides in substance that railroads shall not be allowed to control industries which they serve. It does not, however, say that an industry shall not be allowed to control a railroad. Commissioner Joseph B. Eastman told the House committee that he has always been a strong believer in the principle that railroads should not be allowed to control industries and that industries should not be allowed to control railroads.

Trying to Get Question Tested

In this connection he said:

"We believe that the fair interpretation of that (commodities) clause is that it applies where the industry controls a railroad as well as where the railroad controls the industry, and we have been trying to get that question tested out in the courts."

It was in the course of his testimony proposing repeal of the recapture clause that Commissioner Eastman said that of the total of \$361,000,000 potentially subject to recapture, 15½ per cent represented so-called excess earnings of the Steel Corporation railroads. He proceeded to state that if these roads received relief from recapture, "it may be that they might be able to deal more generously with the railroads in the matter of steel rails. Steel rails are one

of the items which railroads buy on which the price has remained constant ever since, I think, 1923. There has been no reduction in the price of steel rails furnished to the railroads. That is one of the reasons why the cost of reproduction of the railroads tends to remain up.

"The commission has referred that matter to the Department of Justice for investigation under the anti-trust statutes."

Complaints of Stabilized Rail Price

Commissioner Lewis also complained to the committee of the stabilized steel rail price and its bearing on reproduction costs for the railroads.

It is curious that in no place of the extensive testimony was any explanation offered as to the reason for the price of steel rails. While of course it is known to the steel industry and the railroads, it is perhaps not known to the committee that the price was established, as it long has been, by agreement between the steel rail makers and the railroads. Nor was any evidence produced to show that actually the price of \$43, mill, for open-hearth rails, established in 1922, is below the average price during the nine-year period, 1923-1931, of an ordinary rolled product like steel bars and a semi-finished product like wire rods. The average prices of these two products over the nine-year period were \$43.68 and \$43.13, respectively, per gross ton, Pittsburgh. These levels rise above the steel rail price despite the sharp drop in prices in 1930 and 1931. Other comparisons would show a similar trend in the face of the higher costs of producing steel rails with their rigid specifications and the great research work and financial outlay they required.

No Defense of Rail Price

Commissioner Eastman and Commissioner Lewis both intended to be entirely fair in their testimony and indicated as much at different points. There was no conscious prejudice reflected by either, but it has been remarked as a peculiar thing that the much-discussed steel rail price has been given no defense before the committee and other sources where it is desirable that the information should be supplied.

Commissioner Eastman, however, did partially give answer as to the steel rail price when he was asked by Representative Huddleston of Ala-

bama "why has there not been more fluctuations in those prices?"

"Well, we referred it to the Department of Justice, in order that they might investigate whether there was anything in the nature of a conspiracy among the companies to maintain the price. Now, we do not have any information on that matter ourselves, and I would not undertake to express an opinion on it.

"I have been told that the president of the Steel Corporation states the reason is the immense amount of research which has been done by the steel companies in developing excellent rails which will sustain the modern heavy equipment, and that he is rather astonished at his moderation in the matter of prices; but that again is gossip, as far as I am concerned."

Steel Freight Rates Relatively High

"The Steel Corporation originates a vast amount of railroad business," suggested Representative Huddleston. "I am wondering whether that fact cuts any figure on the price of steel rails."

"Well, I think this is true, generally speaking, that the freight rates on iron and steel articles are relatively high, compared with many other freight rates," replied Commissioner Eastman. "They are, in general, profitable rates for the railroads. Whether this has any bearing on the matter I do not know. The railroads are also great purchasers of iron and steel articles, one of the most important purchasers."

Commissioner Eastman said that so far as the railroads controlled by the United States Steel Corp'n. are concerned he had no argument to offer against the recapture clause. He said that if these carriers could be segregated and dealt with alone, he would agree that the recapture provision should not be repealed. He took the same position with regard to Pocahontas coal roads, but conceded that he did not see how it is possible to deal with these roads alone.

At the same time, Mr. Eastman defended the Steel Corporation road rates and pointed out that if they were lowered it would make it necessary to bring down rates of competing lines which could not afford to operate at such reduced rates. Commissioner Eastman explained that some of the Steel Corporation roads operate under the most favorable conditions, which was given as partial explanation for

(Concluded on advertising page 20)

Charles M. Schwab at Three Score and Ten



CHARLES M. SCHWAB, chairman of the Bethlehem Steel Corp., celebrated his seventieth birthday anniversary on Feb. 18. Receiving representatives of the press in his private office at 25 Broadway, New York, amid floral tributes and with a sheaf of congratulatory cablegrams, telegrams and letters lying on the desk before him, he radiated good humor.

When asked to say a word regarding the future, Mr. Schwab was careful to make no predictions regarding the length of the depression. "Sentiment has improved, but it has not yet been reflected in our business," he declared. Then taking a long range view, he added, "I can't see anything but ultimate prosperity and success for our country. In 1901—a boom year—the total production of steel in this country was 12,000,000 tons, of which the United States Steel Corp. made about one-half. It seemed an amazingly big total then, and Mr. Morgan asked me, 'Mr. Schwab, do you think we'll ever again make that much steel in a year?' Well, in 1929, the American steel companies made 54,000,000 tons, and even in 1931, the worst year in the history of the steel business, the total was 50 per cent greater than in 1901.

"I have been building mills for years, and I never built a mill that I did not think was too big, and I never built a mill that did not turn out in time to be too small. There may be a long period of depression, but I am sure that the normal consumption of the American public is going to be much greater than it is today."

Mr. Schwab was asked whether he looked for greater socialization of industry either through pressure from below or voluntary changes introduced from above. He stated that he looks for no radical departures from the present capitalistic system, asserting that when it is developed to finality it will be best for all concerned. The Russian experiment, in his opinion, is doomed to failure.

"Our system can and will be improved," he declared. "Fifty years ago our workmen were treated as machines; now they are treated as human beings." Every year, he said, has brought increasing interest on the part of stockholders in measures for the betterment of workmen and the future will see further changes in their behalf. He mentioned in particular possible improvements in pension

systems and in the care of the sick. He expressed his doubts as to the feasibility of unemployment insurance, but said that much can be done to stabilize employment.

"The Bethlehem company," he said in illustration, "employed 68,000 when running full in 1929. Today it has more than 60,000 on the payroll, although operating at only 25 per cent of capacity."

Mr. Schwab announced that he had retired from all of the directorates of which he was a member except those of the Bethlehem Steel Corp., the Chase National Bank and the Metropolitan Life Insurance Co. He has no intention of withdrawing from the affairs of the Bethlehem company, although he admitted that the time might come when he would be made chairman emeritus.

"The Bethlehem company is an industry of which this country can well be proud," he asserted. "Starting with nothing, Bethlehem now has a capacity of 9,500,000 tons of ingots annually, or nearly double the capacity of the Steel Corporation when I left it in 1904."

Mr. Schwab expressed his satisfaction with the fact that the Bethlehem organization had been built up within itself and that he had never taken a "celebrity" from another company. He could not say too much about those



CHARLES M. SCHWAB



who had collaborated with him in developing the Bethlehem plants, and gave special praise to Eugene G. Grace.

"I consider Mr. Grace the ablest executive for this business that I ever knew," he said. "Grace and I have always made a good team. Grace is the keen, calculating business executive—"

"You forgot to say 'lean' too, this time," Mr. Grace interjected. Mr. Schwab laughed and resumed:

"I am a dreamer, a sentimental man in business. No business can be truly successful unless it has sentiment in it. Men do their best work under the stimulus of appreciation. I've been smart in one respect. That was in picking men like Grace and encouraging them."

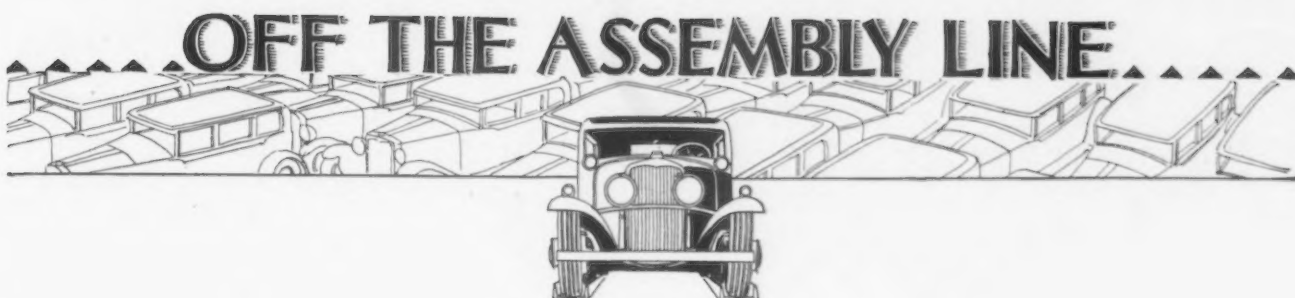
Stainless Steel Patent Suit Not Dropped

Thomas D. McCloskey, president of the American Stainless Steel Co., Pittsburgh, has issued the following statement relating to his company's patents:

"We note a published statement that the suit of the American Stainless Steel Co. against the Rustless Iron Corp. of America for infringement of the Haynes patent has been dismissed upon motion brought by the plaintiff. The American Stainless Steel Co. caused the dismissal of the suit on the Haynes patent only because it appeared that the products of the defendant which infringed that patent and which could be legally proved were inconsequentially small, and the decree dismissing the case re-

served our right to bring a new suit if reason for it should occur in the future. Our companion suit against the same company for infringement of the Clement patent and of the Hamilton and Evans patent is being pushed and has been set for trial this spring. The American Stainless Steel Co. has no intention whatever of discontinuing or abating this litigation."

Surface Combustion Corp., Toledo, Ohio, has received contracts for installing the following equipment: one walking beam type pack furnace for Tennessee Coal, Iron & Railroad Co., Birmingham; two continuous walking beam furnaces for heating packs and pairs in Jones & Laughlin Steel Corp.'s Aliquippa, Pa., tin mills, and one walking beam tin plate normalizing furnace in Youngstown Sheet & Tube Co.'s Indiana Harbor, Ind., plant.



Motor Car Makers Moving Slowly Pending View of New Fords

DETROIT, Feb. 22.

NOW that the first flush of enthusiasm following the Ford announcement has disappeared, the automotive situation looks rather pale. There are no indications of Ford steel purchases on a sizable scale in the immediate future or of releases of appreciable proportions to parts makers. From a retail standpoint, the effect of Mr. Ford's statement has been virtually to paralyze sales in the low-price group. People are apparently postponing the placing of orders for new cars until they see what the new Ford looks like and the price at which it will be sold. In fact, the Ford shadow has enveloped the entire field selling under \$1,000; this is one reason why Mr. Ford's competitors hope that his new products will be on the market shortly.

The retail trade leaves much to be desired. Business along the Atlantic Coast, from Maine south to Baltimore and Washington, has been nearest normal of all sections of the country. There also are bright spots in the south Atlantic area. The large and generally prosperous district comprising Ohio, Indiana, Illinois and Michigan, is yielding a relatively fair volume, while the Pacific Coast has responded in moderately encouraging fashion. The southern half of the Mississippi Valley and the oil country (Oklahoma, Kansas and eastern Texas) are the poorest sources of business. Within this region sales have approached the vanishing point. It is notable that retail demand has been much better in urban centers than in farming communities. This is due to the fact that farmers received little for their crops in 1931 and consequently have no ready money. Little improvement is expected until this year's crops have been harvested. This is a drab outline of the retail condition confronting

Announcement of Ford plans has had the effect of virtually paralyzing sales temporarily in the low-price field.

* * *

Ford is said to have parts for 40,000 new cars at branch assembly plants.

* * *

Rockne "65" and Packard light eight are now in production.

▼ ▼ ▼

ing the automobile industry, but not surprising in the face of the curtailment of buying power.

March Outlook Still Uncertain

With dealers stocked as heavily as necessary to meet the present situation, with the industry headed for lower prices and with retail sales at low ebb, there should be little wonder at the cautious production rate now being maintained by motor car builders. February output is more likely to run under than over January, while the outlook for March is uncertain. Next month's figures ought to be boosted by the beginning of Ford assemblies. Ford is understood to have parts, including frames, bodies and wheels, at branch assembly plants for 40,000 to 50,000 four-cylinder cars, so that dealers can be fairly well stocked for display purposes within a short time. Contrary to general opinion, it is estimated that Ford, with about 8000 dealers, has fewer retail outlets than Chevrolet. Incidentally, there has been much loose talk lately about Mr. Ford's letting down the credit bars so that his customers may have a much longer time than heretofore to pay for their cars. It can be safely

asserted that this talk is without foundation in fact. The Ford steel plant is reported to be operating four open-hearths, including the new 400-ton furnace; the rolling mills are running intermittently.

Rockne Plant Busy

The first Rockne "65" came off the assembly line at the local plant last week and a total of about 1000 cars will be built this month, with 5000 cars scheduled for March. Just now the local factory is working six days a week, eight hours a day, on cars to stock dealers. Packard is now in production on its new light eight, operating 8 hr. a day five days a week. Some departments are running 18 and 24 hr. a day; total employment is about 8700 men. Manufacture of the new twin six Packard will begin soon. Chrysler is believed to have turned out 11,000 cars last month with a slightly larger volume planned this month. The new Plymouth is now under way.

Ford and Oldsmobile are both committed to one chassis for different-sized motors, and the automobile industry is wondering whether this is a forerunner of similar action on the part of other companies. Substantial savings could be made by building one set of frames, wheels and springs for fours and sixes or sixes and eights.

Motor car companies which built up large stocks of pig iron last fall to take care of winter requirements until the Lake navigation season opens in the spring still have enough material on hand to carry them through at least the spring and part of the summer, unless operations increase beyond present expectations. It is interesting to note that pig iron is being trucked now from Detroit to Port Huron foundries, which saves approximately \$1 a ton thereby compared with rail shipment.

OBITUARY

John W. Galvin, Pioneer Open-Hearth Man, Dead at 83

JOHN W. GALVIN, venerable dean of open-hearth men in America, died at Long Beach, Cal., as the result of injuries received in a traffic accident. Mr. Galvin was born in Shannon Harbor, County Galway, Ireland, Oct. 9, 1848, and was brought to this country as a two-year old infant. He started work with the Nashua Iron & Steel Co., Nashua, N. H., at the age of 19. At the Nashua plant he had charge of a Siemens regenerating heating furnace, which was used to heat iron in a hammer shop. This furnace was practically the same as an open-hearth except that the open-hearth has a shallow bottom. The first open-hearth furnace in the United States was built by Cooper and Hewitt at Trenton, N. J., in 1869. The second was constructed by the Bay State Iron Works, South Boston, Mass., in 1870. The latter company sent one of its men to the Nashua plant to learn how to operate gas producers, and, as the Nashua Iron & Steel Co. was then erecting an open-hearth furnace, Mr. Galvin was sent to South Boston to spend three weeks learning how to operate an open hearth.

In 1875 Mr. Galvin left the Nashua Iron & Steel Co. to become associated with the Pennsylvania Steel Co., Steelton, Pa., as open-hearth superintendent. Since the company was not able to get as many heats a week from its furnaces as had been promised by the builders, Mr. Galvin was sent to Wales and France to study European practice. From 1878 to 1880 he was connected with the Roanoke Iron Co., Chattanooga, Tenn., and subsequently was identified with other companies, including the Pacific Coast Steel Co., San Francisco, and the Illinois Steel Co., having been open-hearth superintendent at the last named organization's South Chicago works. In 1903 he became open-hearth superintendent of the Inland Steel Co. plant at Indiana Harbor, Ind., remaining there until 1915, when he retired on account advancing age.

Last summer Mr. Galvin returned to the scene of his boyhood and early training at Nashua, where a tablet was erected with fitting ceremonies commemorating the making of steel-forged ports for the guns of the famous ironclad, the Monitor. He was one of but two surviving members of the shop force of the Nashua Iron & Steel Co. which made these forgings.

Among those of Mr. Galvin's immediate family surviving him are two sons, John E. Galvin, president, the Ohio Steel Foundry Co., Lima, Ohio,

with works at Lima and Springfield, Ohio, and Bay City, Mich., and James W. Galvin, of Chicago, former steel mill superintendent for the Wheeling Steel Corp. at Steubenville, Ohio, and more recently associated with the Arthur G. McKee Co., Cleveland, in designing and constructing open-hearth furnaces in Soviet Russia.

JOHN H. SCHAUMLIEFFEL, one of the founders of the old Marion Gray Iron Foundry, Marion, Ind., died sud-

denly. He settled in Marion 38 years ago and with M. F. Gartland founded the iron company. When the Atlas company absorbed the business, he retired. Mr. Schaumleffel was 73 years old.

SAMUEL M. KIER, formerly president of the Kier Fire Brick Co., Pittsburgh, died in that city on Feb. 17. The company is now a part of the General Refractories Co., Philadelphia.

JOSEPH KERKHOFF, senior partner and general manager, Kenosha Die & Stamping Co., Kenosha, Wis., died Feb. 18, after a brief illness with pneumonia. He was 57 years old.

WILLIAM H. COLE, for over 20 years traveling representative for the Raymond Mfg. Co., Corry, Pa., died at his home in that city on Feb. 16, aged 80 years.

British Trade Still Affected by Tariff Uncertainties

Continental Position Is Worse and Gold Prices Have Weakened Because of Increasing Competition

LONDON, ENGLAND, Feb. 22 (By Cable).—Tariff uncertainties are increasing trading difficulties, but the position of the iron and steel industry is expected to be cleared by Wednesday. The free importation of Indian pig iron is represented here because it is held to be directly responsible for the inaction of four English blast furnaces. Pig iron makers' stocks are large.

The steel trade is inactive. The Continental position has become

worse. Gold prices are weakening because of increasing international competition. English demand is stagnant, while export trade is restricted.

Welsh tin plate makers will meet Tuesday and may effect the proposed arrangement for a regulation of output. The plan provides for the payment of a bonus of 2s. per base box on production below an agreed output percentage, with a fine of the same amount for excess production. The suggested minimum price is 16s., f.o.b. mills. Most of the tin plate works have withdrawn quotations, while others are asking up to 15s. There are fair export sales of tin plate, mainly to Australia, Canada and the Far East.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton		
Ferromanganese, export	£9 0s.	
Billets, open-hearth...	5 7½	to £5 12½s.
Black sheets, Japanese specifications	9 10	to 9 12 6d
Tin plate, per base box	0 14	6d to 0 15
Steel bars, open-hearth	7 17½	to 8 7½
Beams, open-hearth...	7 7½	to 7 17½
Channels, open-hearth...	7 12½	to 8 2½
Angles, open-hearth...	7 7½	to 7 17½
Black sheets, No. 24 gage	8 0	to 8 10
Galvanized sheets, No. 24 gage	9 10	to 10

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$4.86		
Billets, Thomas...	£2 7s. 6d	
Wire rods, No. 5 B.W.G.	5 5	
Black sheets, No. 31 gage, Japanese...	11 5	
Steel bars, merchant...	2 12	
Beams, Thomas...	2 11	6
Angles, Thomas, 4-in. and larger...	2 11	
Angles, small...	2 13	6
Hoops and strip steel over 6-in. base...	3 10	
Wire, plain, No. 8...	5 7½	
Wire, barbed, 4-pt., No. 10, B.W.G.	8 15	

Ohio River Shipments of Steel Decline

Shipments of steel products on the Ohio River in the Pittsburgh district during January amounted to 45,199 net tons, according to the United States Engineer office, Pittsburgh. In December the corresponding movement was 51,138 tons, and in January, 1931, 88,089 tons. Monongahela River commerce steel products amounted to 25,327 tons last month, as compared to 21,360 tons in December, and 90,405 tons in January, 1931. No steel was moved on the Allegheny River in January and none in December, although 50 tons was transported in January, 1931.

PERSONALS

CHARLES N. STODDARD, heretofore vice-president of the Greenfield Tap & Die Corp., Greenfield, Mass., has been elected president and general manager, succeeding FRANCIS G. ECHOLS, who has retired, as announced in these columns on Feb. 4. Mr. Stoddard has served as general counsel and as a director of the Greenfield company since its inception.

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THOMAS W. PANGBORN, president, Pangborn Corp., Hagerstown, Md., has been made chairman of the governing committee and executive vice-president of the Hagerstown Bank & Trust Co.

♦ ♦ ♦

R. H. GROVE, for a number of years chief engineer of the Apollo Steel Co., Apollo, Pa., has resigned, effective March 1. He plans to do some development and experimental work and then engage in business for himself.

♦ ♦ ♦

DR. JOHN A. MATHEWS, vice-president, Crucible Steel Co. of America, will deliver the first Joseph W. Richards memorial lecture at the spring meeting of the Electrochemical Society, to be held April 21 to 23, at the Lord Baltimore Hotel, Baltimore. His address will be on electric alloy steels.

♦ ♦ ♦

W. A. ROSENBERGER has been promoted to the position of chief engineer of the Pangborn Corp., Hagerstown, Md. He was graduated from the Polytechnikum at Zurich in 1909 and came to this country shortly after that. He has specialized in blast cleaning and dust collecting problems for the past 20 years.

♦ ♦ ♦

G. S. PETERSON, for 12 years identified with the furnace department of the Strong, Carlisle & Hammond Co., Cleveland, has opened an office as industrial furnace engineer and contractor at 1836 Euclid Avenue, Cleveland.

♦ ♦ ♦

STATE SENATOR FULLER F. BARNES, of Bristol, Conn., was elected president of the McKinley Association of Connecticut at a meeting of the society in New Haven, Feb. 15. Senator Barnes is chairman of the board of the Wallace Barnes Co. and a prominent figure in the metal-working industry.

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HAROLD B. RESSLER, vice-president, Joseph T. Ryerson & Son, Inc., Chicago, has taken over the management of the company's St. Louis plant. He will be in direct contact with the St.

Louis organization, making regular visits to that territory. In Mr. Ressler's absence, Mr. R. B. WILSON, manager of sales of the St. Louis plant, will be senior resident executive. Mr. Wilson has been with Ryerson for 21 years and has been connected with the St. Louis branch for over 17 years. G. H. RUMP, who was manager of the St. Louis office for several years, has resigned.

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CLIFFORD A. PEASE, financial manager of the Whitney Mfg. Co., Hartford, Conn., last week completed 30 years of service with the company. Mr. Pease entered the employ of the company in 1902, six years after its organization.

♦ ♦ ♦

EDWARD F. BERRY has been appointed advertising manager of the Udylyte Process Co., Detroit. He was at one time research chemist of the Aluminum Co. of America.

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A. E. BALLIN, formerly president of McIntosh & Seymour Corp., Auburn, N. Y., manufacturer of Diesel engines, a subsidiary of the American Locomotive Co., has been elected vice-president of the Nordberg Mfg. Co., Milwaukee, in charge of engineering and sales. ROBERT E. FRIEND was reelected president at the annual meeting of the directors of the Nordberg company; EDWIN C. BAYERLEIN was elected senior vice-president and treasurer; GEORGE W. LOWE was reelected secretary, and JAMES A. FRIEND, assistant secretary.

♦ ♦ ♦

FRED J. BLANEY, for the past nine years superintendent of the General Alloys Co., Boston, and formerly of the Driver Harris Co., Harrison, N. J., has resigned his position to take charge of the alloy division of the Ohio Steel Foundry Co., Springfield, Ohio. Mr. Blaney is one of the pioneers in the making of heat-resisting alloys and had training under the supervision of his father, who was general manager of the Benjamin Atha Steel Casting Co.

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CHARLES B. KING has resigned as vice-president of the Marion Steam Shovel Co., Marion, Ohio. He has been connected with the company 37 years.

♦ ♦ ♦

E. J. LEES, who has been associated with the Lees-Bradner Co., Cleveland manufacturer of gear-making machinery, since its organization, has severed his connection with that company and is now affiliated with the



C. N. STODDARD

National Tool Co., Cleveland, as engineer.

♦ ♦ ♦

H. E. HENRY has been placed in charge of sales in the Cleveland territory for the Ex-Cell-O Aircraft & Tool Corp., Detroit, with headquarters at 1240 Bender Avenue, Cleveland. FRANK STROTHER, formerly supervising sales at Cleveland, has been transferred to the home office at Detroit. WILLIAM H. SCHEER, heretofore in the Dayton territory working out of Cincinnati, has been transferred to the Chicago office to cover northern and western Indiana and southwestern Michigan.

♦ ♦ ♦

IRVING M. SMITH, formerly connected with the sales department of the Alan Wood Steel Co., Philadelphia, has become identified with the Central Iron & Steel Co., Harrisburg, Pa., and will specialize in the sale of steel floor plates and kindred products.

Office Changes

Morse Chain Co., Ithaca, N. Y., a division of Borg-Warner Corp., has been appointed exclusive sales agents for Morse. Pullmore clutches, manufactured by the Rockford Drilling Machine Co., another division of Borg-Warner. This sales arrangement is made to avoid duplication of sales efforts as the Morse industrial sales division specialize on power transmission units.

International-Stacey Corp., Columbus, Ohio, has removed its Fort Worth, Tex., offices and those of its subsidiary companies, including International Derrick & Equipment Co., Roots-Connersville-Wilbraham, Stacey Brothers Gas Construction Co. and Stacey Mfg. Co., to 307 Southland Life Insurance Co. Building, Dallas, Tex. F. W. Mohler, midcontinent sales manager, and C. B. Coldwell, sales engineer, Stacey and Roots-Connersville-Wilbraham divisions, and S. B. Creamer, sales engineer for Ideco, are located in the Dallas office.

Frick-Reid Supply Co., Pittsburgh and Tulsa, Okla., has opened a new Pacific Coast sales office in the Richfield Building, Los Angeles.

Barber-Greene Co., Aurora, Ill., manufacturer of standardized material-handling machines, appointed Boeck Equipment Co., Milwaukee, as sales representative in Wisconsin. Boeck Equipment Co. is a new organization with offices and warehouse at 2404 West Clybourne Street.

• • EDITORIAL

What Leadership Cannot Do

THE American people have learned that cheermasters cannot lead them out of the depression, and they are not sympathetic with any belated efforts to create false enthusiasm. They are properly distrustful of any proposed shortcuts to economic recovery.

But the very severity of disillusionment, after repeated disappointments, has blinded the public to the good that has come out of protracted adversity. Industrial strife has been at a minimum throughout the depression; only recently the railroad brotherhoods agreed to wage reduction for the first time in their history. At Washington, political bickering has been suppressed, and both Democrats and Republicans have given whole-hearted support to emergency legislation. At all of our seats of government—national, State and local—there is increasing interest in the balancing of budgets, indicating a growing realization that political units, like private businesses, must adjust expenditures to reduced incomes.

In the face of all that has been said of lack of leadership, there is accumulating evidence that our leaders are doing their part. It is now time for the rank and file to enter into the spirit of the situation. Without their participation, the best laid plans will fail. Budgetary economies and increases in taxation will safeguard governmental credit and emergency statutes will relieve the pressure on our banking system, but these are, after all, passive factors, which must be backed up by the positive action of private enterprise. In the last analysis, business betterment calls for courage—and courage cannot be created by legislative enactment or Presidential proclamation.

Mechanization and Living Conditions

THE everyday conveniences in his home which the average American worker enjoys compared with the lack of such conveniences by his European brethren have been pointed out on numerous occasions. Now we have specific data bringing into clear relief this contrast in living conditions.

The document which provides this information is the report of the so-called Ford wage inquiry of the League of Nations' International Labor Office. This is an exhaustive study of living expenses in Detroit compared with those in leading European and English cities. As reported in *The New York Times*, the study commands interest.

The average Ford worker in Detroit lives in a four or five room house occupied exclusively by his family and equipped with electricity, gas, central heating and a bathroom. "In most of the European towns included in this inquiry," says the report, "houses of such a type rarely exist. Particular difficulty was experienced with regard to bathrooms, since in many European towns it is not usual

to find bathrooms installed in working-class dwellings."

Said Mr. Clarence Streit in the *Times*, "The office ended by frequently making two estimates, a lower one showing what the closest equivalent to the Detroit dwelling would cost in working-class quarters, and a higher one showing what the equivalent would cost no matter in what quarter—and it was often found in the middle-class quarter of the city."

One revelation was the heavy burden of taxation on workers' incomes on the Continent, whereas in Detroit the worker is exempt.

All of which points to the fact that mechanization of industry in this country has brought with it many contributions to a higher standard of living to which American workmen long ago have become accustomed and now take for granted.

Altering the Sales Approach

LOW prices have been extensively paraded before the eyes of American consumers in recent months. Retail merchants now report that the low price argument has lost effect in stimulating sales. The appetite of the consumer for bargains has become jaded.

Much the same change has occurred in industry. The sales appeal of cost cutting has lost force through constant repetition. So has price. A bargain is no longer a bargain when everyone sells on a bargain basis.

Sensing the change in sentiment and noting how ineffectual the "cost cutting" argument had become in selling his product, a Midwestern tool builder has recently turned to the improvement of the customer's product as the main support on which to base his selling. The response has been surprisingly favorable. Several important orders have been secured on the basis of refinement of the quality of the customer's product, where the cost cutting argument would not have succeeded.

This may serve as a reminder that it pays the manufacturer of industrial equipment to get away from the obvious and freshen his sales appeal. The decision in placing a machine order does not rest entirely on the mechanical design of the tool, its application to the job and its price. The method by which its use will enable the customer to turn out a better product is a factor of prime importance.

IN America we may have overbuilt temporarily in some directions—in office buildings in some of the big cities and in hotels—but as a whole the country is probably short of an adequate supply of residential buildings. There are many old ones that ought to be demolished and replaced, and there is much electrification of railways and homes that awaits being done.

C O M M E N T . .

Another Phase of Modernization

APPPLICATION of the modernization principle is not restricted to shop equipment. It can and should be applied with equal thoroughness to management, methods and morale. Fine machinery plus a perfectly laid out plant do not necessarily represent a modernized company. The equation is incomplete without the inclusion of the human factor.

Gordon Lefebvre, former vice-president in charge of production of the Oakland Motor Car Co., called attention to this in recently addressing the Society of Automotive Engineers, emphasizing particularly the necessity of foreman training. "Battles are won," said Mr. Lefebvre, "in proportion to the efficiency of an army's non-commissioned officers, and the rate of progress of any manufacturing establishment is in direct ratio to the efficiency of its minor executives."

Workmen cannot be expected to show the necessary interest in their company's progress unless the foreman is first taken into the management's council and confidence and given an understanding of policies and objectives. Yet relatively few companies carry on a program for educating and training their foremen, despite the fact that these "key" men can effectively open or close the door upon plant morale.

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No Abatement of Thirst for Knowledge

IT is significant that the depression did not seriously interfere with the attendance at the convention of the mining and metallurgical engineers last week, which is reported on other pages.

Even last June, when the American Society for Testing Materials held its annual meeting in Chicago, a new record for attendance was established. Evidently the effect of the economic upheaval has not retarded the search for knowledge of metallurgists and research workers. In fact in research the common report is that marked activity has been and is being maintained in most steel and metal laboratories.

It is certain that, in a large majority of cases, the company which pursues its quest for new facts in these days of business stagnation is making an investment from which large returns will ultimately come.

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JANUARY'S increase of steel production over December—13 per cent, or equal to the average expansion of all the preceding ten Januarys—is better than indicated by the statistics. In December no inconsiderable amount

of semi-finished material was made without definite orders and solely to add to year-end wages, all in a Christmas spirit. In one particular plant the amount was equal to more than a half-month's output at full capacity. The only warrant for the management was that the steel was sure to be called for eventually. Seeing that in most forms of steel, owing to variety of demands in respect to quality, shapes and sizes, not to mention inspection at times, finished product cannot be made without knowledge of the requirements, the practice is another commentary on the humanitarian attitude that broadly has pervaded all industry. Tales could be recounted almost without end of the special efforts that have been made all up and down the metal-working field to keep as many people employed as possible.

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Steel Corporation Railroad Earnings

COMMISSIONER Eastman recently presented figures to the House Committee on Interstate Commerce showing that since 1920 so-called excess earnings of railroads had aggregated some \$361,000,000. Of this total, he stated that about 15 per cent represented returns by Steel Corporation lines. Broken down, it was shown that the estimated recapture liability of the Duluth, Missabe & Northern railroad is \$25,462,836; of the Bessemer & Lake Erie, \$11,370,624 and of the Elgin, Joliet & Eastern, \$9,374,365. Mr. Eastman was asking for repeal of the recapture clause, but said if railroads generally had earned as much as had the Steel Corporation lines he would favor retention of the provision.

It is difficult to understand why the Steel Corporation should be penalized for its business acumen in establishing prosperous railroads. Moreover it is obvious that its largest revenue producer could not safely be asked to reduce its rates. For if it were made to do so, competing ore carriers, earning much less, would be put out of business.

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THE steel industry, as a whole, is more patent minded today than ever in its history. This is not to be taken as an indication that the basic ideas of the average steel executive have changed, but that necessity is driving him to new lines of thought.

There are a number of companies in this country that have created almost a monopoly of certain patented processes. This has had its effect upon the capital stock structures and earning performance of the corporations concerned.

New ideas and new processes are now being sought for more intensely than ever. The object is to secure such cost reductions and improvements in quality, as to assure a favorable competitive position.

... LETTERS TO THE EDITOR ...

Dangers in Anti-Trust Law Changes

Editor, *The Iron Age*:

ACCENTUATED by the current depression, there is being created considerable sentiment among employers to amend or repeal the anti-trust laws in order to permit attempts to equalize production with consumer demand.

It is my belief that under present-day political psychology greater freedom for industrial combinations cannot possibly be secured without equivalent concessions in respect to governmental supervision of business. Political opinion will not at this stage of our development extend any power to the industrialists which might result in oppressing the public without surrounding that power with governmental restraint to protect the public.

Having in mind these grave considerations, it is feared that however conservative a bill may be presented to Congress in connection with these matters, the political forces there at work might so alter it in the course of its legislative journey that the ultimate outcome would be injurious to the business interests of the country. Legislative opinion at the present time is not sufficiently convinced of the capacity of business for self-restraint to insure a sympathetic attitude toward any desire of business for greater liberty or power.

This condition presents a possible danger from legislative action in two specific ways: First, organized labor, which has always been seeking exemption from the anti-trust law, may join hands with some of the business interests who have not carefully considered all sides of this question, to bring about the enactment of measures which will give greater liberty to destroy the "open shop," without giving corresponding liberty to the employers; secondly, a bill which starts with provisions for moderate supervision on the part of the government may, even before its enactment, be amended, for the purpose of securing the votes of more radical interests, so as to involve a large measure of governmental regulation.

There is very grave danger, therefore, that present-day exigencies may stampede our people into unnecessary changes of this kind which would not even constitute a remedy for our difficulties. Let it not be forgotten that European countries, without anti-trust laws, are also suffering from overproduction and unemployment. There is much ground for question as to whether our anti-trust laws have materially contributed to our present difficulties or whether

their amendment would constitute a substantial remedy.

I am entirely in accord with the idea that certain administrative changes could be made in the anti-trust laws which might prove beneficial to business, but I doubt very much the wisdom of opening the door even to that extent for fear that uncontrollable political forces might lead to other results.

Homer D. Sayre, Commissioner
National Metal Trades Association

How Public Works Would Help the Tool Maker

Editor, *The Iron Age*:

WITH due respect to Mr. Warner, whose views are stated in the Feb. 4 issue of *THE IRON AGE*, in connection with relief plans outlined before the Taylor Society at New York on Jan. 27, may I take exception to the statement:

Public works, in his opinion, also have the defect of being specialized in their nature. They provide an outlet for the talents of bricklayers, carpenters and general laborers, but offer little solace to tool makers or screw machine operators.

This may be the layman's point of view at the scene of building operations, but let us go "back-stage."

The Government is now erecting a postoffice building in Pittsburgh. Would it be possible to construct it without "tool makers or screw machine operators" having a large part

in its building? No indeed. These trades, along with punch press operators, drop forgers, foundry molders, sheet metal workers, wire makers, lamp makers, glass makers, paint makers, motor and elevator builders, drill press hands, ad infinitum, are required to make the tools to do the work, to make the thousands of parts that will be used in the completed structure, from the small screws in the lighting fixtures and switches, to the stampings and castings used in the mail boxes, the door hardware, the mail racks, etc. Almost every kind of artisan, even back to the producer of ore for castings and steel and copper, indirectly is benefited by the building of every structure, from the simple home to a towering Empire State building.

I am not debating the public works question, but believe the leaders of thought should be either more explicit in their statements or more analytical, as even road building requires the tool maker and screw machine operator to make the machines—the road diggers, rollers, concrete mixers, trucks, etc.—that are "back-stage" when we watch the actual road making operation.

The metal-working trades, machinery builders and foundries would be hard pressed if public works—buildings or roads—were actually produced in their entirety by bricklayers, carpenters and general laborers. Even these trades require tools produced by tool makers and screw machine operators.

It is true the "tool maker" may be located in Connecticut and the "screw machine operator" in Illinois, but you cannot localize business recovery.

H. W. Wolff

4041 Bigelow Boulevard
Pittsburgh, Pa.

Gear Makers' Meeting to Be Held May 12-13

The sixteenth annual meeting of the American Gear Manufacturers' Association will be held May 12 and 13 at the Hotel Statler, Cleveland. A comprehensive program is being planned. The executive committee of the association will meet May 11 at the same hotel. T. W. Owen, 3608 Euclid Avenue, Cleveland, is secretary of the association.

To Exhibit 100-h.p. 22-in. Lathe and Other Tools

The American Tool Works Co., Cincinnati, will exhibit 23 or more new model lathes, radial drills and shapers at its plant throughout the week beginning March 7. The machines will be demonstrated in operation at feeds and speeds permitted by the most advanced type of cutting tools.

Outstanding will be the initial showing of the new 22-in. 100-hp. Super-Lathe developed by the General Electric Co. for testing cemented tungsten-carbide cutting tools. This machine, to be employed in determining the maximum commercial speed and feed rates of the new hard alloy tools in cutting various ferrous and non-ferrous metals, is described as a radical departure from established principles of lathe design. Although the swing is limited to 22 in., the lathe is proportioned to transmit the full capacity of its 100-hp. 6-to-1 adjustable-speed driving motor.

A joint convention of the American Supply and Machinery Manufacturers' Association, the National Supply and Machinery Distributors' Association and the Southern Supply and Machinery Distributors' Association will be held in Cincinnati May 2 to 4. The change from White Sulphur Springs, W. Va., was made because of the more central location of Cincinnati.

SUMMARY OF THE WEEK'S BUSINESS

Price Stabilization Extends to Bars, Plates and Shapes

Leading Producers Announce \$2 Advance for Second Quarter—
Steel Business Fails to Gain—No Important Ford Orders Yet

INDUSTRIAL production, as reflected in orders for steel, has shown no response to the obvious improvement in business sentiment that has resulted from Government efforts to bring about economic recovery. Steel ingot production has, in fact, declined another point this week to 26 per cent of the country's capacity. The sharpest drop has occurred in the Wheeling district, which is at 35 per cent against a recent rate of 50 per cent. Only at Cleveland has there been a gain, and that is small.

Expectations of the steel industry that a belated seasonal rise of some proportions will occur are borne out by the announcements of leading producers of bars, plates and shapes of a \$2 a ton advance in the prices of these products, effective on second quarter business. This move follows closely the efforts of the flat-rolled branch of the industry to stabilize prices of sheets and strip steel, with some grades now firmly quoted at higher levels.

THE failure of the steel industry to maintain this month the rate of improvement that occurred in January is manifestly due in large part to the caution of the automobile industry pending the public showing of the new Ford models. The effect of the recent Ford announcement has been virtually to paralyze sales in the low-price group. Meanwhile, steel orders from the Ford company have not reached steel mills in significant volume, while specifications from other automobile companies have declined. February automobile output may be less than that of January, while the March outlook will remain uncertain until the Ford schedules are known.

A slow revival of buying interest now apparent among the railroads assumes an importance at a time like this greater than the actual tonnage that has been placed. There are no new rail orders of importance, but the Milwaukee Road will buy 16,000 tons of rails and 4000 tons of accessories and the Chicago & Alton will take 7000 tons of rails. Of even greater interest is the fact that the Alton will dismantle 8000 freight cars, 116 locomotives and 100 passenger coaches. The Wheeling & Lake Erie is inquiring for 50 to 100 steel gondola cars, the Belt Line Railway of Chicago has contracted with a car builder for the repair of 100 hopper cars and the Kansas City Southern may rebuild 25 hopper cars in its own shops. While these would be small items in a normal period, they signify greater activity than has been observed in the railroad equipment field in many months.

Building construction is not yet showing evidence of seasonal acceleration. Private building work, both in the contracting and formative stages, is at low ebb, but the Federal building program will be pushed ahead, and projects that soon may be closed call for 75,000 tons of structural steel.

Metal-working industries generally are experiencing no stimulus either from seasonal influences or any other cause, their situation reflecting the lack of investment in both capital goods and consumer goods.

PRICE adjustments in iron and steel are downward as well as upward. A reduction of \$4 a ton on copper-bearing steel pipe follows a drop of like amount a week ago on wrought iron pipe with which it competes. The leading producer of silvery iron and Bessemer ferrosilicon has announced lower prices ranging from \$1 to \$4.50 a ton on the commonly used grades. Higher prices are to be put into effect by the makers of bolts and nuts; quotations on billets, slabs and sheet bars are steadier and slightly firmer because of pending advances on finished products; cold-rolled strip steel is now being quoted by some mills at 2c., Pittsburgh or Cleveland, \$2 to \$3 a ton above recent levels.

In making price increases at this time steel companies are plainly convinced that the extremely low quotations of the past three months have not encouraged buying, but rather have discouraged it, and their belief is that in the period of probably slow recovery lying ahead they will receive as much business at a price level which at least may represent costs of production as at one which spells large losses.

The higher prices recently announced on sheets have not yet been tested except on a few small lots, but they have resulted in some business at the old quotations for delivery over the remainder of this quarter. There is a possibility of a further advance for second quarter, though large users may be permitted to contract for that period at the quotations put into effect last week.

PIG iron production probably will show a slight increase this month. The Steel Corporation has blown in one Valley furnace and the Republic Steel Corp. will put one on this week. In addition, two merchant furnaces in the Valleys that supply iron to ingot mold makers have gone into service, these resummptions reflecting the light stocks of pig iron now carried in the Valleys. Pig iron shipments to the foundry trade have not gained to any marked extent.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, one Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	Feb. 23, 1932	Feb. 16, 1932	Jan. 26, 1932	Feb. 24, 1931
No. 2 fdy., Philadelphia.....	\$15.64	\$15.64	\$15.64	\$17.76
No. 2, Valley furnace.....	15.00	15.00	15.50	16.50
No. 2 Southern, Cin'ti.....	13.82	13.82	13.82	14.19
No. 2, Birmingham.....	11.00	11.00	11.00	13.00
No. 2 foundry, Chicago*.....	16.50	16.50	16.50	17.50
Basic, del'd eastern Pa.....	16.25	16.25	16.25	17.25
Basic, Valley furnace.....	14.50	14.50	15.00	16.50
Valley Bessemer, del'd P'gh..	17.39	17.39	17.89	18.76
Malleable, Chicago*.....	16.50	16.50	16.50	17.50
Malleable, Valley.....	15.50	15.50	16.00	17.00
L. S. charcoal, Chicago.....	23.17	23.17	23.17	27.04
Ferromanganese, seab'd carlots.....	†75.00	†75.00	†75.00	80.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Rails, Billets, etc.,

Per Gross Ton:				
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	34.00	34.00	34.00	36.00
Re-rolling billets, Pittsburgh..	27.00	27.00	27.00	30.00
Sheet bars, Pittsburgh.....	26.00	26.00	27.00	30.00
Slabs, Pittsburgh.....	27.00	27.00	27.00	30.00
Forging billets, Pittsburgh...	33.00	33.00	34.00	36.00
Wire rods, Pittsburgh.....	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh. lb.,	1.50	1.50	1.50	1.60

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.50	1.50	1.50	1.65
Bars, Chicago.....	1.60	1.60	1.70	1.70
Bars, Cleveland.....	1.55	1.55	1.55	1.70
Bars, New York.....	1.85	1.85	1.85	1.98
Tank plates, Pittsburgh.....	1.50	1.50	1.50	1.65
Tank plates, Chicago.....	1.60	1.60	1.70	1.70
Tank plates, New York.....	1.798	1.798	1.798	1.93
Structural shapes, Pittsburgh..	1.50	1.50	1.50	1.65
Structural shapes, Chicago...	1.60	1.60	1.70	1.70
Structural shapes, New York...	1.76775	1.76775	1.76775	1.90 1/2
Cold-finished bars, Pittsburgh	2.00	2.00	2.00	2.10
Hot-rolled strips, Pittsburgh..	1.40	1.40	1.40	1.55
Cold-rolled strips, Pittsburgh..	1.90	1.90	1.90	2.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel

Per Lb. to Large Buyers:	Feb. 23, 1932	Feb. 16, 1932	Jan. 26, 1932	Feb. 24, 1931
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.15	2.15	2.15	2.35
Hot-rolled annealed sheets, No. 24, Chicago dist. mill..	2.30	2.30	2.30	2.45
Sheets, galv., No. 24, P'gh...	2.75	2.75	2.80	2.90
Sheets, galv., No. 24, Chicago dist. mill.....	2.85	2.85	2.90	3.00
Hot-rolled sheets, No. 10, P'gh	1.60	1.60	1.60	...
Hot-rolled sheets No. 10, Chicago dist. mill.....	1.70	1.70	1.75	...
Wire nails, Pittsburgh.....	1.95	1.95	1.95	1.90
Wire nails, Chicago dist. mill	2.00	2.00	2.00	1.95
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill.	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago dist. mill.....	2.65	2.65	2.65	2.60
Tin plate, 100 lb. box, P'gh...	\$4.75	\$4.75	\$4.75	\$5.00

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh...	\$10.25	\$10.25	\$10.25	\$13.00
Heavy melting steel, Phila...	7.37 1/2	7.37 1/2	7.50	10.50
Heavy melting steel, Ch'go...	7.12 1/2	7.12 1/2	7.25	10.00
Carwheels, Chicago.....	7.50	7.50	7.50	10.50
Carwheels, Philadelphia.....	10.50	10.50	10.50	13.50
No. 1 cast, Pittsburgh.....	9.75	9.75	10.00	12.50
No. 1 cast, Philadelphia.....	10.00	10.00	10.00	11.50
No. 1 cast, Ch'go (net ton)...	7.50	7.50	7.50	9.50
No. 1 RR. wrot., Phila.....	8.50	8.50	8.50	12.00
No. 1 RR. wrot., Ch'go (net)..	6.50	6.50	6.50	8.00

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt.....	\$2.25	\$2.25	\$2.25	\$2.50
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	6.50	6.62 1/2	7.62 1/2	10.37 1/2
Electrolytic copper, refinery..	6.00	6.00	7.12 1/2	10.00
Tin (Straits), New York.....	22.25	22.15	22.35	27.12 1/2
Zinc, East St. Louis.....	2.82 1/2	2.82 1/2	2.95	3.95
Zinc, New York.....	3.19 1/2	3.19 1/2	3.32	4.30
Lead, St. Louis.....	3.55	3.55	3.55	4.35
Lead, New York.....	3.75	3.75	3.75	4.60
Antimony (Asiatic), N. Y....	6.75	6.50	6.00	7.10

▲▲▲ The Iron Age Composite Prices ▲▲▲

Finished Steel

Feb. 23, 1932	2.037c. a Lb.
One week ago	2.037c.
One month ago	2.037c.
One year ago	2.142c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.

	High	Low
1931	2.142c., Jan. 13;	2.052c., Dec. 29
1930	2.362c., Jan. 7;	2.121c., Dec. 9
1929	2.412c., April 2;	2.362c., Oct. 29
1928	2.391c., Dec. 11;	2.314c., Jan. 3
1927	2.453c., Jan. 4;	2.293c., Oct. 25
1926	2.453c., Jan. 5;	2.403c., May 18
1925	2.560c., Jan. 6;	2.396c., Aug. 18

Pig Iron

	\$14.48 a Gross Ton
	14.48
	14.65
	15.71

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
\$15.90, Jan. 6;	\$14.79, Dec. 15	
18.21, Jan. 7;	15.90, Dec. 16	
18.71, May 14;	18.21, Dec. 17	
18.59, Nov. 27;	17.04, July 24	
19.71, Jan. 4;	17.54, Nov. 1	
21.54, Jan. 5;	19.46, July 13	
22.50, Jan. 13;	18.96, July 7	

Steel Scrap

	\$8.23 a Gross Ton
	8.23
	8.33
	11.17

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low
\$11.33, Jan. 6;	\$8.50, Dec. 29	
15.00, Feb. 18;	11.25, Dec. 9	
17.58, Jan. 29;	14.08, Dec. 3	
16.50, Dec. 31;	13.08, July 2	
15.25, Jan. 11;	13.08, Nov. 22	
17.25, Jan. 5;	14.00, June 1	
20.83, Jan. 13;	15.98, May 1	

Prices of Bars, Shapes and Plates Advanced

\$2 for Second Quarter

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PITTSBURGH, Feb. 23.— Announcement of higher second quarter prices by makers of bars, plates and shapes, and continued efforts to stabilize quotations on flat-rolled steel products have been the outstanding developments of the past week.

Business sentiment continues favorable, but specifications for finished steel products have barely held their own. In fact, some producers report a decline in releases. New buying is almost negligible, although a few users are placing rush orders from time to time to meet intermittent manufacturing requirements. No change in the rate of steel taking is reported in the leading consuming industries, although aggregate demand from the automobile trade seems to be a little lighter.

Orders placed by the Ford Motor Co. are slow to be released, and no new buying of significance is reported from this source. The building industry continues to mark time, although a resumption of outdoor work is forecast by initial inquiries for reinforcing bars and structural steel to be used in Pennsylvania road work. Buying by the railroads has gained little momentum, although some inquiry for accessories is before the trade. A local mill has shared in the rail purchase of the Nickel Plate Railroad.

Steel ingot production in the Pittsburgh district continues at about 23 per cent of capacity, but declines have occurred in the Valleys and in the Wheeling district. Production in the latter territory has dropped to about 35 per cent following several weeks of 50 per cent output.

Finishing mill schedules are also lower, with declines principally noticed in sheets and strip steel. Output of tin plate is somewhat higher, particularly at independent plants. The local rail mill is being operated occasionally, but not on a definite schedule.

The price stabilization movement undertaken earlier in the month has been given considerable impetus by the announcements of higher second quarter prices on the heavy hot-rolled products. Sheet and strip quotations are holding at the new levels on the small number of light purchases which are being made, but can hardly be said to have met any test. Prices on wire products are remarkably well maintained, although here again buying has

Bars, plates and shapes to be quoted at 1.60c., Pittsburgh, for second quarter, a \$2 a ton advance.

* * *

Continued efforts being made to stabilize prices of flat-rolled steels.

* * *

Ingot operations steady at Pittsburgh, but decline at Wheeling and in the Valleys.

* * *

Volume orders not yet released by Ford Motor Co. No significant change in other steel consuming channels.

▼ ▼ ▼

not developed in important volume. Semi-finished steel quotations have also been strengthened by the firmer price schedules of finished products.

Pig Iron

No significant purchases are reported. Buying is principally in car-load lots for immediate shipment. Such transactions offer little test of current prices, but no deviations are reported. Foundry operations have failed to gain this month and are about the same as they were in December and January. Makers of radiators and sanitary equipment are preparing for higher spring schedules, but have not yet boosted their requirements.

Semi-Finished Steel

Efforts to strengthen prices on flat-rolled steel products have given the market on billets, slabs and sheet bars a firmer tone. Sellers quote all three products at \$27, Pittsburgh, although contract tonnage on producers' books is at a lower figure in some cases. Prices on forging billets range from \$33 to \$35 a ton. Wire rods are well maintained at \$37, Pittsburgh or Cleveland, although there is little business to test the market.

Rails and Track Supplies

Some inquiry for accessories is coming out, but the rail market is quiet in this district. The local producer shared in the tonnage placed recently by the Nickel Plate. Current speci-

fications call for occasional rollings of rails and accessories, but tonnage is being accumulated if possible for March and April schedules, which are expected to be higher.

Bars, Plates and Shapes

One important maker of heavy hot-rolled products has named 1.60c., Pittsburgh, as its minimum price on second quarter business, although tonnage for current shipment is still being booked at 1.50c. The advance may not be applicable to reinforcing bars.

Current tonnage in bars, plates and shapes, shows little change, although bars are somewhat less active than they were in January. Public outdoor work is not yet beginning to open up, although the Pennsylvania Highway Department will take bids Feb. 26 on several bridges which will require about 2000 tons of structural steel and 280 tons of reinforcing bars. Generally speaking this State's road-building program for the year is not expected to take much steel, as activity will be confined principally to secondary thoroughfares which will not be of concrete construction. Fabricated structural jobs throughout the district are scarce and local shops are still reducing their backlogs. However, it is reported from Washington that the Federal program of large public works is to be reinstated and at least 75,000 tons of structural steel is said to be involved. River craft activity continues in Government work alone, although many private projects are still under consideration. Railroad purchases of steel show no increase, and the bar requirements of the automobile industry are lighter.

Cold Finished Steel Bars

Specifications are still light, and aggregate tonnage this month has shown no improvement over that of January. Mills are active only a day or two each week. Prices are well maintained at 2c., Pittsburgh.

Tubular Goods

Demand for pipe has shown no change, although distributors are said to be showing more interest in spring stocks of standard material. Most of them have practically no inventory, but mills are well supplied with the ordinary sizes. Activity in line pipe

is confined to secret negotiations, some of which will likely result in orders next month. Pipe makers believe that Federal efforts to release credit will be particularly beneficial to prospective builders of pipe lines. Pipe mill activity in the district ranges from 15 to 20 per cent of capacity as a number of units, particularly of the lap-weld type, have been idle for some time.

Wire Products

Jobbers have not begun to place tonnage in significant volume, but many of them are beginning to exhaust their stocks taken in before the recent price advance. Current sales are being made at the full market prices, although quantities are small. Manufacturers' wire is quoted at 2.20c., Pittsburgh, and nails at \$1.95 a keg, in carload lots.

Sheets

While incoming tonnage has been lighter in the last week, total releases still compare favorably with the average for the year to date. No additional Ford tonnage has been reported placed and material ordered previously is said to be held up in some cases. The requirements of the other automobile companies are still diminishing. General demand shows little appreciable change, with no sustained improvement indicated in any of the principal consuming groups.

Higher prices recently announced have been given little test, although a few small orders have been taken at the new levels. Makers of tin mill black plate have announced a minimum price of 2.40c., Pittsburgh. Operations are lower at about 25 per cent of capacity.

Tin Plate

Specifications have been increased by some consumers and the market outlook seems more favorable. A number of independent producers are running at 50 per cent or better and the average for the industry is about 40 per cent, a gain from the preceding week. However, some makers are stocking considerable tonnage and current releases are not sufficient to justify production schedules.

Strip Steel

Orders are numerous, but tonnage is generally small. Makers are badly in need of the customary large orders from the automotive industry in order to regulate their production schedules, and some of them are forced to turn down rush orders because of lack of tonnage for particular units. While 1.40c. and 1.50c., Pittsburgh, have been named as minimum prices, on hot-rolled strip, efforts are still being made to get a premium on small lots, and the market is quotable at a range of \$1 a ton. Cold-rolled strip is still quotable at 1.90c. to 2c., Pittsburgh.

Coke and Coal

Demand for domestic coal and coke

is still far below normal for this season, and industrial movement shows no change. Movement of foundry coke is particularly disappointing, as scarcely any of the larger consumers have stepped up their requirements. No activity is reported in the furnace grades.

Old Material

The scrap market has passed through another quiet week and seems to be softer. Dealers can buy against

old orders at slightly lower figures, but are able to make shipments in most cases, and no surplus is accumulating. Some buyers predict a slightly lower market in the near future, but any material rise in ingot operations would probably bring about an immediate upturn in quotations. An independent dealer has purchased a small local railroad, which, when dismantled, will yield about 20,000 tons of scrap. This material will probably come into the market during the summer.

Valley Steel Makers Expect Better Business in March Despite Present Lull in Demands

YOUNGSTOWN, Feb. 22.—While Valley steel companies were disappointed by the failure of steel releases last week to reflect the improvement in general business sentiment, most of them continue to expect a rather substantial gain in volume during March. Orders from the Ford Motor Co. have not yet reached Youngstown district companies in significant volume, and specifications from other large automobile companies have declined. General demand for steel products shows no appreciable change, and, as a result, aggregate tonnage during the first three weeks of February barely equaled corresponding January totals with some producers and reflected a slight decline in the case of others.

Pipe business is still dormant, but consumers are beginning to show a little more interest in their spring requirements. Definite line pipe inquiry is still lacking, but projects in prospect continue to require the interest of both the large makers. Reinforcing bar demand is a little stronger, but has not yet felt any real seasonal impulse. Movement of wire products is also awaiting a seasonal turn, but releases have gained sufficiently to allow the local mill to operate at a slightly higher rate. Demand for tin plate has been sufficient to permit the independent maker to average 50 per cent in schedules, while the corporation units are running at a somewhat lower rate.

Steel ingot production is scheduled to decline this week, principally because of curtailment in the operations of the leading independent producer in its Valley and northern Ohio plants. As a result, output this week will approximate 25 per cent of capacity, after having ranged from 27 to 30 per cent in the last two weeks. In the face of this, a gain in the rate of basic iron production has been registered with the addition of a Steel Corporation stack, while the Republic company will put its Massillon, Ohio, furnace in operation this week. These operations reflect the comparatively light stocks of pig iron now carried

in the Valleys and indicate the belief in an improved demand for steel-making iron next month. The fact that two merchant furnaces have resumed production during the month is of less significance to the steel trade, even though both of them supply ingot mold manufacturers. Sheet and strip production is lower this week, and bar mills have failed to hold recent gains in production. Output of skelp and pipe is virtually unchanged.

The price structure, particularly on flat-rolled products, is receiving considerable attention, and steel makers are adhering to recently announced minimum quotations on sheets and strip steel on such miscellaneous tonnage as is being taken. However, tonnage booked at lower figures still figures prominently in makers' obligations, and the test of tonnage buying by Ford has not been met. On other products prices are comparatively stable. A reduction of approximately \$4 a ton in copper-bearing steel pipe has been made by the local producer.

Sellers of semi-finished steel regard the market on billets, slabs and sheet bars at \$27, Youngstown, although sales of the latter product at \$26 are admitted. Stabilization of the flat-rolled selling schedules is expected to be reflected in the market on semi-finished. No sizable sales of scrap are reported, and the pig iron market is quiet.

McClintic-Marshall Buys Pacific Coast Fabricator

The McClintic-Marshall Corp. at San Francisco has absorbed the California Steel Co., an independent local fabricator of structural steel, and Charles E. Spencer, for many years proprietor and active manager of the latter company, has joined the McClintic-Marshall organization in association with A. W. Charlton, manager at San Francisco.

Chicago Iron and Steel Market Making No Headway; Operations Do Not Gain

CHICAGO, Feb. 23.—The iron and steel market is not making headway from the viewpoint of tonnage, but there is some strengthening of various phases of the supporting structure. It is quite noticeable that small miscellaneous inquiries from railroads are more numerous, and rail buying shows a small but distinct improvement. Automobile plants appear to have checked the downward revision of operating schedules and in some directions slight improvement is noted. From all indications, little support can be expected from now on from the farm implement group. Structural tonnage being placed over a wide territory shows some improvement and several old projects have recently been closed. The largest of these is for 4000 tons for a viaduct at Justice Park, Ill.

Reviewing the finished steel market as a whole, new buying and specifications are slightly heavier. This does not represent a net gain because it tends merely to level off the rather sharp drop that occurred in mid-February. Ingot operations range from 23 to 24 per cent of capacity, with some promise that a moderate gain will be shown in the near future. Track accessory departments are already busier and releases against contracts are expected to bolster rail mill production. The scrap market presents a mixed picture. Consumption remains light and dealers seem at times to be more interested in keeping this commodity moving rather than to hold price levels. Incoming supplies are limited in most grades. The Chicago & Alton will dismantle 116 locomotives, 8000 freight cars and 100 passenger cars.

Pig Iron

February shipments of Northern foundry iron are showing a 10 per cent gain over the total for January. The March trend is still uncertain except that orders on books are heavier. Following a period of some variation in prices, there now seems to be more support to the price structure. Reports are that Southern iron may be advanced.

Bolts, Nuts and Rivets

A producer to the east of Chicago is putting into effect advances in prices. The industry is operating between 25 and 30 per cent of capacity.

▲▲▲
Except for minor improvement in railroad buying and some gain in structural steel, conditions are unchanged.

* * *

Ingot output for Chicago district this week at 23 to 24 per cent

* * *

Pig iron shipments this month showing a 10 per cent gain over those of January.

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Hot-Rolled Strip

Efforts are being made to increase prices \$1 a ton. Quotations here range from 1.50c. to 1.55c. a lb. for wide strip and 1.60c. to 1.65c. for narrow.

Demand is light and variable.

Reinforcing Bars

Most of the activity in this market centers around Illinois State road work. Low bidders at the February letting have been announced, and bids on additional work will be taken March 9. A small tonnage of rail steel bars is moving to various bridge jobs. There is little work on architect's boards. Shop operations are said to be the lowest on record, and improvement is not in sight. Sellers are resisting buyers' efforts to get lower prices, and as a result a few old projects are still hanging over the market.

Structural Material

New work remains scarce. The Government is prepared to take bids on 1000 tons for dam and lock work on the Illinois River at Marseilles. Here and there, scattered over the Midwestern States, are small bridge programs, which, with other lettings, are affording small outlying fabricators a more comfortable position than is enjoyed by shops in Chicago. Steady shipments of fabricated materials are now being made for the Chicago Post Office.

Rails and Track Supplies

The Chicago & Alton will enter the market for 7000 tons of rails. The Chicago, Milwaukee, St. Paul & Pacific has issued inquiries for 16,000

tons of rails and 4000 tons of accessories. The Nickel Plate and the Erie are in the market for a total of 16,000 tons of track supplies. Chicago mills have taken orders for 9000 tons, most of which is for nearby delivery. Track accessory departments are speeding production and have fair backlogs for three or four weeks.

Cast Iron Pipe

The few large projects on which figures have been taken are delayed, and sellers are dependent on miscellaneous lots of very small size. Wilmette, Ill., is planning a filter plant and extension to water mains, but this project, like many others, is threatened by a poor bond market.

Plates

Production schedules are highly variable in the absence of plate orders in sizable lots. Tank projects, some of which several weeks ago reached the stage of formal inquiries, are still overhanging the market, with little promise of immediate action. Both private and railroad car shops are confining activity to small lots of minor repairs, and the outlet for plates in this direction is extremely limited. Small quantities are moving to current bridge and building work.

Bars

Sales of mild steel bars are growing slowly, but commitments are small, and the only satisfaction sellers derive from them is the fact that they are coming from a wide circle of users. Specifications, after having dropped off, are somewhat more liberal, though all the ground recently lost has not yet been regained. Alloy steel bars are in lighter use as a reflection of reduced activity in automobile manufacturing plants. Rail steel mills have irregular schedules and specifications remain highly variable. The barn equipment industry has lost most of its meager gain in output and the bed industry is slackening its pace.

Sheets

Some sellers are announcing higher quotations on No. 24 hot-rolled annealed sheets and on the galvanized product. The new price on hot-rolled annealed sheets is 2.30c. a lb., Chicago mills, with 2.95c. quoted on galvan-

ized. Incoming orders are still very small, but they come from many sources. Mills are carrying only light stocks of black sheets for galvanizing. Container manufacturers in this district continue to operate on fair schedules.

Wire Products

Production remains near 25 per cent of capacity, which closely balances shipments. There is no indication of the opening of spring trade. Use by manufacturers is varying little from week to week. A moderate increase is noted in demand for wire rope for oil well drilling operations. Use of copper wire is light in spite of the low price for the metal.

Old Material

A steel mill has taken 10,000 tons of heavy melting steel at \$7.25 a gross ton, delivered, and another user has purchased a small tonnage at \$7. Supplies appear to be tightening and dealers are offering \$7 a ton, delivered, in order to meet the needs of consumers. Tonnages offered by railroads are small. Incoming shipments of cast iron borings are ample to meet a recent mill commitment, but the outlook for additional sales is not good, and brokers are again anticipating a nearby time when dock accumulations will begin to grow. Some dealers are paying \$6 a ton, delivered, for hydraulic bundles, which are being applied against sales at \$6.50. Steel foundries are occasionally buying small lots of scrap, but gray iron foundries seldom come into the market. The Milwaukee Road is offering 1000 tons of rerolling rails.

Buffalo Steel Operations at Fairly Steady Rate

BUFFALO Feb. 23.—The pig iron situation is unchanged. No improvement in the melt is detected except by one producer, who has shipped more iron thus far in February than in January.

Steel

The Lackawanna plant of Bethlehem Steel continues this week to operate eight open-hearths. Republic Steel operated four open-hearths commencing last Friday after a shutdown from the preceding Tuesday. Last week was normally an off week with Republic, but the same operation is being continued this week. The Seneca Iron & Steel Co. is maintaining a schedule of 30 to 35 per cent, as is the Buffalo Bolt Co. Wickwire Spencer is operating one open-hearth. Activity in fabricated structural and reinforcing bars is at a minimum.

Old Material

The only sale of consequence was 1000 tons of No. 1 cupola cast at a reported price of \$9. Stove plate, No. 1 machinery cast and short shoveling turnings are scarce.

St. Louis Pig Iron Market Enlivened by Receipt of Second Quarter Inquiries

ST. LOUIS, Feb. 23.—Some encouragement has been given to the pig iron market by the receipt during the last week of inquiries that are said to total about 2000 tons for second quarter delivery, the first of such inquiries. Makers report that there seems to be a better tone to the market. Prices are unchanged.

Finished Steel

It is reported here that a bridge across the Mississippi River at Baton Rouge, La., which will require 40,000 tons of structural steel, is contemplated by the Missouri Pacific Railway and the Louisiana State Highway Commission jointly. It is stated that the plan has been approved by Congress, but has had an adverse report from the Interstate Commerce Commission.

St. Louis building projects are being held up until after April 1, which has been fixed as the date by the building contractors for putting wage

reductions of 33 1-3 per cent into effect. The plan has not been accepted by the unions.

The United States Engineer office at St. Louis will take bids on 20 pontoons, requiring about 200 tons of steel.

Old Material

A leading East Side melter bought approximately 3000 tons of No. 2 heavy melting steel at 25c. a ton less than was paid on the preceding purchase, dealers' prices being revised downward accordingly. The tonnage purchased was disappointing to the trade. A sale of locomotive tires at \$1 lower than the preceding sale also caused a corresponding reduction in dealers' prices. Other items on the list are nominally unchanged, and may remain so until there is some buying to definitely establish a change in the quotations. The only railroad list was that of the New York, Chicago & St. Louis, 29 carloads.

Birmingham Pig Iron Market Still Sluggish, but Some Gains Are Made in Steel

BIRMINGHAM, Feb. 23.—The pig iron market continues to follow a sluggish course. February volume will fail to equal January's. Shipments to the smaller foundries are being maintained at a fair rate, but the larger foundries have lately curtailed their supplies. Quotations are holding to a \$11 base for district sales. Pipe bookings were slightly better during last week, and there is some indication of gradual improvement. The resumption of operations by the Woodward Iron Co. on Feb. 16, after a shutdown since Dec. 15, brought the first change in the number of active furnaces since the first of the year. Woodward No. 2, which had been banked, went into production again. Another furnace is still banked. Operations will be at a minimum. There are now seven active stacks in Alabama, three being on basic iron, three on foundry iron and one on recarburizing iron.

Steel

New tonnage of the two steel manufacturers in this district showed an improvement last week, compared with the business of the preceding week. The gain is only moderate, and the market is far from good, but there has been an encouraging trend of late. One company has received thus far in February more tonnage

than it had in all of January. Sheets have been selling at a fair rate and wire demand is slightly better. Sheet prices are firmer.

Open-hearth operations for several weeks have been at the same rate, 11 being active. Wire mill operations of Gulf States Steel have been stepped up, but other mills of the company continue on low schedules.

Old Material

The market continues to lack activity. There is only occasional buying. Contract shipments are still reduced. Some dealers report that a better feeling is beginning to appear, but other dealers say there is very little hope of an early change.

Blaw-Knox Products To Be Made on Coast

The Blaw-Knox Co., Pittsburgh, and the Western Pipe & Steel Co., San Francisco and Los Angeles, have closed an agreement whereby the latter company will manufacture Blaw-Knox products on the Pacific Coast and will sell through a new company to be known as the Blaw-Knox & Western Pipe Corp., and to be jointly owned by the two companies.

Cleveland Mill Operations Rise, Though Business Is No Better

Ingot Output at 38 Per Cent, an Increase of One Open-Hearth—
Automobile Orders Are Light

CLEVELAND, Feb. 23.—There was no improvement in the demand for finished steel in any form the past week, and orders for sheets and strip steel did not hold up to recent volume. However, one producer put on an additional open-hearth furnace this week, increasing local steel plant operations to 38 per cent of ingot capacity, or the same rate as early in the month.

Business with consuming industries in the metal-working field continues slack, and these are ordering steel in very small lots. Orders from the motor car industry during the past week were light. The Ford Motor Co. is reported to have placed orders for automobile frames for its new models, but releases against these orders have not been issued. Other parts makers are still waiting for the placing of Ford orders.

Attempts to stiffen prices that were started recently with sheets have been extended to bars, plates and shapes, for which some leading producers have named 1.60c., Pittsburgh. The 1.50c. price had become common for all classes, and an attempt will be made to put the market on a higher basis, at least for all but large users. The producers who have named the advance have also marked their Cleveland bar price up \$2 a ton to 1.65c. However, a local mill is still quoting 1.55c. Bolt and nut makers have also announced a price advance. With no round lot buying of sheets by the motor car industry, the new sheet prices have not yet been given much of a test.

Pig Iron

The improvement in shipments over those of January is being maintained. However, sales are light, there being no general revival of interest since the slump in orders that followed the moderate amount of activity in the latter part of January. One producer sold 4000 tons in small lots during the week, but very little business was taken by other Lake furnaces. The \$15, Lake furnace, price is being maintained for foundry and malleable iron for this immediate territory, although this price is being shaded for shipment to points where a portion of the freight rate must be absorbed to meet competition. For Cleveland delivery the \$16, furnace, price is being maintained.

Bolts and Nuts

Immediate withdrawal of present prices on bolts and nuts and an advance to 75 per cent off list was an-

nounced in notices sent out by a leading producer to its trade Feb. 22. This is an advance of between 10 and 15 per cent over the present regular discount of 73, 10 and 10. However, concessions from this discount have appeared frequently. Manufacturers claim that even with good operations they cannot make a profit with recent prices. Stove bolts are unchanged. Orders show a slight gain from railroads and jobbers and a little business is now coming from implement manufacturers. Demand from the motor car industry is spotty. Rivets are dull.

Iron Ore

Consumption of Lake Superior ore amounted to 1,153,560 tons in January, a decrease of 76,080 tons. This compares with 2,349,522 tons consumed in January last year. Furnace stocks Feb. 1 were 31,083,410 tons and amount at furnaces and Lake Erie docks on that date was 36,893,313 tons, compared with 36,619,938 tons on the same date a year ago. There were 56 furnaces in blast using Lake ore Jan. 31, a gain of five for the month.

Bars, Plates and Shapes

Considerable highway bridge work is in prospect, and this is expected to result in more activity in the structural field during the early spring. At present inquiry is light. An addition to a local industrial plant will take 200 tons. Bars are very quiet. Some inquiry has come out for second quarter, the interest of consumers evidently having been aroused by the possibility of higher prices.

Sheets

The new prices are being generally quoted, but as yet have been given little test and that mainly on hot-rolled annealed sheets, for which a few orders were taken during the week at 2.20c. Local business was very light the past week. Ohio mills took little tonnage from the Michigan territory.

Strip Steel

Slowing down by some of the manufacturers of automotive accessories is reflected in a decline in the demand for hot-rolled strip. Prices are steady at 1.40c. for wide and 1.50c. for narrow material. Cold-rolled strip can still be bought at 1.85c., Cleveland.

Railroad Business

The track fastening inquiry from the Nickel Plate Railroad includes 1800 gross tons of tie plates, 4500

kegs of spikes and 1500 kegs of heat-treated bolts.

Old Material

While no new demand developed from consumers during the week, some activity is looked for around the first of the month. Several Valley mills and a Cleveland consumer are taking limited quantities against outstanding orders. However, all shipments to one Youngstown district plant have been held up. While the market shows no strength, prices appear to be at the bottom. Dealers are paying \$9 to \$9.50 for No. 1 heavy melting steel for Valley district delivery, \$8 to \$8.50 for No. 2 and \$9 to \$9.25 for compressed sheet steel.

New England Structural Work Is Increasing

BOSTON, Feb. 23.—An increase in pig iron buying reported a week ago turned out to be only a flurry. Sales the past week dropped to a few hundred tons. There are no open inquiries in the market. Most foundries are well covered and are operating on greatly reduced schedules or closed.

Fabricated Steel

Major lettings of fabricated steel so far this month total 3517 tons, or 1108 tons more than for all of January. This increase is the first in any month in a long time. About 1000 tons is expected to be closed this week, which would make February the best month in about a year.

Reinforcing Steel

Billet bars from stock, in one to five ton lots, are holding well at 2.75c. a lb., base. Car lots are now generally 1.90c. a lb., base, contrasted with 2.15c. late in 1931. New business is developing slowly, and the 1700 tons hanging over the market apparently is no nearer closing than it was a week ago.

Old Material

A little stove plate was shipped to New Jersey the past week, for which \$3.35 a ton, on cars shipping point, was paid. Otherwise, nothing transpired to relieve an almost stagnant scrap market.

The total national income for 1930, estimated by the National Industrial Conference Board, New York, at \$71,000,000,000 in terms of actual or current dollars, showed a decrease of 16.4 per cent as compared with 1929. In terms of the 1913 dollar the decrease was 13.1 per cent. The income per person, of those having gainful occupations in 1930, was 17.6 per cent less in actual dollars than it was in 1929, while in terms of the 1913 dollar it was 14.4 per cent less. The per capita income was also 17.6 per cent less in actual dollars in 1930 as compared with 1929 and 14.3 per cent less in terms of the 1913 dollar.

Philadelphia Sentiment Better But Business Is Not Improved

Steel Plant Operations Continue at Low Rate of Recent Weeks—
Price Stabilization Proceeds

PHILADELPHIA, Feb. 23.—Despite the dullness of the market here, there is unquestionably an improved sentiment. This seems to be due largely to Federal legislation enacted and under way that seeks to bring about economic recovery. The nearer approach of spring also is a factor. Whether this sentiment will develop into an actual upturn remains to be seen. Some railroads are showing a slightly improved interest and are placing miscellaneous orders for small tonnages. Operations continue at about 17 per cent of capacity.

Pig Iron

The only activity is confined to carlot shipments, almost exclusively of foundry iron. Sellers report prospective tonnages on a heavier scale, but inquiries have not taken definite form. Prices are unchanged and, in the absence of an actual buying movement, are untested.

Ferromanganese

Light specifications have been made the past week against contracts. While there are reports of small foreign tonnages closed below domestic prices, they do not appear to have affected the established levels. These levels at seaboard, are \$72 for more than 2000 tons, \$73.50 for 1000 to 2000 tons and \$75 for up to 1000 tons.

Sheets

Makers report that they are adhering to the recently announced higher prices when quoting on new business. The market is listless and lack of inquiry from the automobile trade is especially disappointing.

Plates, Shapes and Bars

Mills are trying to establish an increase of \$2 a ton by restoring the level of 1.60c., Pittsburgh, which prevailed at the opening of the year. The advance is to apply to second quarter business. Some small tonnages have been placed by railroads. The New York Shipbuilding Co., Camden, N. J., has a contract to recondition five vessels for the American Seantic Line, Inc., to which a loan has been made by the Shipping Board. Bids will be opened here tomorrow on 4500 tons of structural material for the Franklin Memorial.

Warehouse Business

Shipments in February were at practically the same rate as in January. Inquiry is light and prices are unchanged.

Imports

Imports last week were: Pig iron from British India, 151 tons; steel bars from Belgium, 107 tons; steel strips from England, 3 tons; galvanized steel strips from England, 5 tons.

Old Material

Extreme dullness prevails. Neither new inquiries nor mill releases of importance have developed.

Cincinnati Pig Iron Melt Gaining Slightly

CINCINNATI, Feb. 23.—Demand for pig iron in this district during February has shown no change from that in January, but shipments on old contracts have been better. Consumers show a disposition to clean up old commitments, but hesitate to anticipate future needs. New business the past week totaled less than 1000 tons, all in carload lots. The melt is improving slightly.

Old Material

Movement of scrap on old contracts is slightly better. New business, however, is negligible. Some sheet clippings, turnings and blast furnace scrap are being accepted.

Canadian Steel Mill Resumes Operations

TORONTO, Feb. 22.—It was announced from Sault Ste. Marie, Ont., that 700 men returned to work today at the plant of the Algoma Steel Corp. Two open-hearth furnaces were started up last Thursday and the blooming mill on Friday. There has been a slight improvement in business recently as a result of activities in the automotive industry, but most other lines are dull. No railway buying has developed.

The fact that Canadian funds are discounted in the United States tends to stimulate to some extent the domestic buying of iron and steel. With the Canadian dollar at a discount of 12 to 15 per cent in New York, together with the present tariff on iron and steel products, there is little buying of these materials across the international boundary. This situation also has tended to divert to Great

Britain considerable buying of materials not produced in Canada. There has been a general increase in imports of various lines of iron and steel materials from Britain.

Pig Iron

Some indications of improvement in business have appeared in this market, but melters continue to buy in small lots for immediate needs. There is the possibility that an additional furnace will be blown in shortly at Sydney, N. S. Pig iron prices are firm.

Structural Steel

Word from Quebec is that bids will be called in the spring for the first section of the proposed Lachine-Cauchawaga bridge, and construction will be started in the summer. This undertaking will require about 5000 tons of steel.

Old Material

Consumers are buying only for actual needs. Steel scrap is at a standstill. Dealers are out of the market and have made no revision in price lists.

Pacific Coast Steel Prices May be Advanced

SAN FRANCISCO, Feb. 22.—Slight weakening in mill quotations, especially on plates and sheets, and slight strengthening in warehouse and small-lot prices have been evident in both the Los Angeles and San Francisco markets during the past week. Although intercoastal ocean freight carriers have announced a conference advance as of March 1, definite revision of mill schedules c.i.f. Pacific Coast ports has not yet been made. It is generally expected that the advance on rolled steel will be \$3 a ton.

Many members of the trade feel that an opportunity is presented in this advance to firm the market generally and to bring forth delayed orders for stock and deferred specifications. A new schedule may be expected during the coming week.

Detroit Scrap Market Quiet; Prices Unchanged

DETROIT, Feb. 23.—There was a mild flurry of scrap buying late last week, but this has subsided. Sentiment among dealers is less cheerful than a week ago. Prices are unchanged.

Electric Hoist Manufacturers Association, 165 Broadway, New York, will hold its fifteenth annual meeting on March 17 at Hotel McAlpin, New York.

New York District Shows No Change in Business Trend

Principal Development Is Announcement of \$2 a Ton Advance in Bars, Plates and Shapes

NEW YORK, Feb. 23.—Leading producers of bars, plates and shapes have announced an advance of \$2 a ton to 1.60c., Pittsburgh, on these products for second quarter. Most of the current contracts are at 1.50c., Pittsburgh, or 1.60c., Eastern basing points. This advance follows closely on the heels of the move made by makers of flat-rolled steel to establish a stabilized and higher level of prices on sheets and strip steel. Cold-rolled strip steel, which has been sold recently at 1.85c. and 1.90c., Pittsburgh and Cleveland, will henceforth be quoted at 2c.

The higher sheet prices have not been obtained on much new business, but the fact that such advances have been announced has resulted in an increase in specifications against first quarter contracts. Some consumers that had not made first quarter contracts have bought sufficient supplies at the old prices to carry them through March. Sheet buying has therefore been the most active feature of Eastern steel trade the past week.

Aside from this spurt in sheet business, there has been no noticeable

change in the volume of steel business in the New York district.

Pig Iron

Although demand has not gained appreciably in volume, specific inquiries are more numerous. Several pending lots ranging from 100 to 300 tons include 150 tons of malleable and 50 tons of special iron for prompt delivery to Foster-Wheeler Corp., Carteret, N. J. Bookings in the past week totaled 3000 tons, compared with 2500 tons in each of the two preceding weeks. Foreign iron continues to be a serious competitor in this district, particularly because the attractive quotations on that iron involve chiefly the higher silicon grades. Sellers view with concern the fact that domestic furnace stocks of high silicon grades are generally at a low point, and, with only one active stack along the seaboard, it appears likely that the high silicon requirements of Eastern foundries will be satisfied largely by import iron, at least until additional stacks are blown in at some of the Eastern furnaces.

they grow older," continued Dr. Merica. "Sometimes they age, or age-harden, at room temperatures; sometimes they must be aged at higher temperatures. A single day is often adequate to bring about the desired changes in mechanical properties, although slight changes may continue for a month.

"What happens is that there is generated or precipitated throughout the metal or alloy a host of extremely fine, sub-microscopic particles of a hardening constituent. These very fine particles, uniformly distributed throughout the matrix of the metal, harden it.

"The significance of this development in the metal field is that it is now potentially within our power to harden practically any metal or alloy we please, and thus to put these formerly soft and weak metals and alloys on a comparable footing with steel as regards mechanical properties. The next decade will undoubtedly witness a substantial realization of our promise in this respect," said the lecturer.

Coming Meetings

March

Concrete Reinforcing Steel Institute. March 7 to 9. Annual meeting, Atlanta Biltmore Hotel, Atlanta, Ga. M. A. Beeman, Tribune Tower, Chicago, secretary.

American Society for Testing Materials. March 7 to 11. Spring committee meetings, Hotel Cleveland, Cleveland. C. L. Warwick, 1315 Spruce Street, Philadelphia, secretary.

Institute of Scrap Iron and Steel. March 8 to 10. Annual meeting, Mayflower Hotel, Washington. Benjamin Schwartz, 11 West Forty-second Street, New York, director.

Age-Hardening Widens Use of Non-ferrous Metals

"MANY metals and alloys hitherto mechanically inferior to steel may now be brought up to the standard of steel, as far as mechanical properties are concerned, through the development within the past decade of a process known as age-hardening," said Dr. Paul D. Merica, vice-president of The International Nickel Co., Inc., New York, in the annual lecture of the institute of metals division of the American Institute of Mining and Metallurgical Engineers, on the "Age-Hardening of Metals," given at the institute's annual meeting in New York on Feb. 17. "As a result, the sphere of usefulness of the non-ferrous metals will be widened," he said.

"Until comparatively recently," said Dr. Merica, "steel has been practically the only metal which could be hardened and strengthened by heat treatment. Hence, because of its cheapness, it has become an indispensable material of construction. The non-ferrous metals—copper, lead, zinc, nickel, aluminum, tin—in many re-

spects superior to steel because of their corrosion resistance and electrical properties, have had limited usefulness in the past because it has not been possible to improve their mechanical properties by heat treatment.

"During the past ten years, however, the metallurgist's power to apply heat treatments usefully in the hardening of non-ferrous metals has been substantially broadened, through his understanding of the basic principles of 'age' or 'precipitation' hardening. All of the common metals may now be alloyed in such a manner as to render them susceptible to age-hardening. Copper, for example, may be hardened to about 400 Brinell, a value comparable with that of spring steel. Copper-nickel alloys may be heat treated to exhibit tensile strengths in the neighborhood of 175,000 lb. per sq. in., also comparable with the strength of heat-treated steel.

"After certain heat treatments, these age-hardening alloys harden as

Transit Department of Boston has awarded Lincoln Electric Co., Cleveland, a contract for 28 motors to drive ventilating fans in the new East Boston traffic tunnel now under construction. Seven exhaust and seven intake fans at each end of the tunnel are required.

Motors will be of all welded steel construction.

Orders placed for business furniture in 1931 were valued at \$14,903,422, against \$24,197,780 in 1930, according to reports received by the Bureau of the Census from 36 plants. Orders placed in December increased to \$911,076 from \$909,937 in November.

Alco Products, Inc., a division of American Locomotive Co., New York, has received orders for 1000 tons of riveted steel tunnel lining to be used in the 20-mile aqueduct, known as City Tunnel No. 2, under construction between Yonkers, N. Y., and Brooklyn.

Prices of Finished and Semi-Finished Steel,

BARS, PLATES, SHAPES

Iron and Steel Bars Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.50c. to 1.60c.
F.o.b. Chicago.....	1.60c. to 1.70c.
Del'd Philadelphia.....	1.81c. to 1.91c.
Del'd New York.....	1.85c. to 1.95c.
F.o.b. Cleveland.....	1.55c.
F.o.b. Lackawanna.....	1.60c. to 1.70c.
F.o.b. Birmingham.....	1.70c.
C.i.f. Pacific ports.....	2.00c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.50c. to 1.60c.
F.o.b. Birmingham, mill lengths.....	1.75c.
F.o.b. Cleveland.....	1.40c. to 1.50c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.30c. to 1.35c.
F.o.b. Chicago Heights mill.....	1.50c. to 1.60c.
Del'd Philadelphia.....	1.49c. to 1.59c.

Iron

Common iron, f.o.b. Chicago.....	1.70c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.11c.
Common iron, del'd New York.....	2.15c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.50c. to 1.60c.
F.o.b. Chicago.....	1.60c. to 1.70c.
F.o.b. Birmingham.....	1.70c.
Del'd Cleveland.....	1.7035c. to 1.8035c.
Del'd Philadelphia.....	1.6935c. to 1.7435c.
F.o.b. Coatesville.....	1.60c. to 1.65c.
F.o.b. Sparrows Point.....	1.60c. to 1.70c.
F.o.b. Lackawanna.....	1.60c. to 1.70c.
Del'd New York.....	1.798c. to 1.898c.
C.i.f. Pacific ports.....	1.80c. to 1.85c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.50c. to 1.60c.
F.o.b. Chicago.....	1.60c. to 1.70c.
F.o.b. Birmingham.....	1.70c.
F.o.b. Lackawanna.....	1.60c. to 1.70c.
F.o.b. Bethlehem.....	1.60c. to 1.70c.
Del'd Cleveland.....	1.7035c. to 1.8035c.
Del'd Philadelphia.....	1.5995c. to 1.6495c.
Del'd New York.....	1.76775c. to 1.86775c.
C.i.f. Pacific ports (standard).....	2.05c.
C.i.f. Pacific ports (wide flange).....	2.15c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh.....	1.90c.
F.o.b. Chicago mill.....	2.05c.
F.o.b. Buffalo.....	2.00c.

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy	Quantity	Bar Base, 2.65c. per Lb.	Differential per 100 Lb.
S.A.E. Series Numbers			
2000 (1/2% Nickel).....			\$0.25
2100 (1 1/4% Nickel).....			0.55
2300 (3 1/4% Nickel).....			1.50
2500 (5% Nickel).....			2.25
3100 Nickel Chromium.....			0.55
3200 Nickel Chromium.....			1.35
3300 Nickel Chromium.....			3.80
3400 Nickel Chromium.....			3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....			0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....			0.70

4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Cold-Finished Bars

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.00c.
Bars, f.o.b. Chicago.....	2.00c.
Bars, Cleveland.....	2.00c.
Bars, Buffalo.....	2.00c.
Shafting, ground, f.o.b. mill.....	*2.35c. to 3.30c.

*According to size.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh.....	1.55c. to 1.60c.
No. 10, f.o.b. Chicago mills.....	1.65c. to 1.70c.
No. 10, del'd Philadelphia.....	1.86c. to 1.96c.
No. 10, f.o.b. Birmingham.....	1.70c. to 1.80c.
No. 10, c.i.f. Pacific Coast ports.....	2.35c.

Hot-Rolled and Annealed

No. 10, Pittsburgh.....	1.70c. to 1.75c.
No. 10, Chicago mills.....	1.80c. to 1.85c.
No. 10, Birmingham.....	1.85c. to 1.90c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh.....	2.15c. to 2.20c.
No. 24, f.o.b. Chicago mills.....	2.25c. to 2.30c.
No. 24, del'd Philadelphia.....	2.46c. to 2.51c.
No. 24, f.o.b. Birmingham.....	2.35c. to 2.50c.
No. 24, c.i.f. Pacific Coast ports.....	2.90c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh.....	2.10c. to 2.25c.
No. 10 gage, f.o.b. Chicago mills.....	2.20c. to 2.35c.
No. 10 gage, del'd Philadelphia.....	2.41c. to 2.46c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh.....	2.65c. to 2.75c.
No. 20 gage, f.o.b. Chicago mills.....	2.75c. to 2.85c.
No. 20 gage, del'd Philadelphia.....	2.96c. to 3.06c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	2.80c. to 2.90c.
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Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh.....	2.50c. to 2.65c.
No. 20, f.o.b. Pittsburgh.....	3.05c. to 3.25c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh.....	2.75c. to 2.85c.
No. 24, f.o.b. Chicago mills.....	2.85c. to 2.95c.
No. 24, del'd Philadelphia.....	3.06c. to 3.16c.
No. 24, f.o.b. Birmingham.....	2.95c. to 3.00c.
No. 24, c.i.f. Pacific Coast ports.....	3.40c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh.....	2.90c. to 3.00c.
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Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh.....	2.60c.
No. 20, f.o.b. Pittsburgh.....	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.40c. to 2.50c.
No. 28, Chicago mill.....	2.50c. to 2.60c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills.....	\$4.75
Standard cokes, f.o.b. Gary.....	4.85

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$9.50	25-lb. coating I.C. \$14.10
15-lb. coating I.C. 12.00	30-lb. coating I.C. 14.90
20-lb. coating I.C. 13.00	40-lb. coating I.C. 16.70

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh.....	1.50c. to 1.55c.
Wider than 6 in., P'gh.....	1.40c. to 1.45c.
6 in. and narrower, Chicago.....	1.60c. to 1.65c.
Wider than 6 in., Chicago.....	1.50c. to 1.55c.
Cooperage stock, P'gh.....	1.60c. to 1.70c.
Cooperage stock, Chicago.....	1.70c. to 1.80c.

Cold-Rolled Strips

F.o.b. P'gh.....	1.90c. to 2.00c.
F.o.b. Cleveland.....	1.85c. to 2.00c.
Del'd Chicago.....	2.20c. to 2.30c.
F.o.b. Worcester.....	2.05c. to 2.15c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	2.85c. to 3.00c.

STEEL PIPE AND TUBING

plementary discounts of 5 and 2 1/2%, and on galvanized by 1 1/2 points with supplementary discounts of 5 and 2 1/2%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2 1/2 in. 38	1 1/2 in. 1
2 1/2 in.—2 3/4 in. 46	1 3/4 in. 8
3 in. 52	2 in.—2 1/4 in. 13
3 1/2 in.—3 3/4 in. 54	2 1/2 in.—2 3/4 in. 16
4 in. 57	3 in. 17
4 1/2 in. to 6 in. 46	3 1/2 in. to 3 3/4 in. 18
	4 in. 20
	4 1/2 in. 21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts: Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
1 in. 61	3 in. 46
1 1/4 to 1 1/2 in. 53	3 1/4 to 3 1/2 in. 48
1 3/4 in. 37	4 in. 51
2 to 2 1/4 in. 32	4 1/2, 5 and 6 in. 40
2 1/2 to 2 3/4 in. 40	

Hot Rolled

2 and 2 1/2 in. 38	3 1/4 to 3 1/2 in. 54
2 1/2 and 2 3/4 in. 46	4 in. 57
3 in. 52	4 1/2, 5 and 6 in. 46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30% base (carloads)...	55
Carbon, 0.30% to 0.40% base.....	50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld			
Steel	Galv.	Iron	Galv.
Inches		Inches	
1/4.....	47	1 1/4 and 3/4.....	+9 +34
1/2.....	53	1 1/2.....	25 7
3/4.....	58	1 3/4.....	28 13
1.....	62	1 and 1 1/4.....	33 17
1 to 3.....	64	1 1/2 and 2.....	37 20
Lap Weld			
2.....	57	2.....	25 11
2 1/2 to 6.....	61	2 1/2 to 3 1/2.....	30 15
7 and 8.....	58	4 to 6.....	32 19
9 and 10.....	56	7 and 8.....	31 18
11 and 12.....	55	9 to 12.....	28 13
Butt Weld, extra strong, plain ends			
1/4.....	43	1/2 and 3/4.....	+11 +46
1/2.....	49	1.....	25 9
3/4.....	55	1 1/2.....	30 14
1.....	60	1 to 2.....	36 20
1 to 1 1/2.....	62		
2 to 3.....	63		
Lap Weld, extra strong, plain ends			
2.....	55	2.....	31 15
2 1/2 to 4.....	59	2 1/2 to 4.....	36 22
4 1/2 to 6.....	58	4 1/2 to 6.....	35 21
7 to 8.....	54	7 and 8.....	33 19
9 and 10.....	47	9 to 12.....	23 10
11 and 12.....	46		

On carloads the above discounts on steel pipe are increased on black by one point, with sup-

Bolts, Nuts, Coke, Coal, Fuel Oil, Cast Iron Pipe

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)
(After Dec. 31, extras of 10c. a 100 lb. on mixed
and joint carloads, 25c. on pool carloads and 40c.
on less than carloads will be applied on all mer-
chant wire products.)

To Manufacturing Trade	
Bright wire	2.20c.
Spring wire	3.20c.
To Jobbing Trade	
Standard wire nails	Base per Keg \$1.95

Smooth coated nails	1.95
Galvanized nails	3.90

Base per Lb.	
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c.
Galvanized staples	2.75c.
Barbed wire, galvanized	2.60c.

Woven wire fence, Nos. 9 and 11 gage,	per net ton	\$55.00
Woven wire fence, No. 12½ gage and	lighter, per net ton	60.00
Anderson, Ind., mill prices are ordinarily		
\$1 a ton over Pittsburgh base; Duluth,		
Minn., and Worcester, Mass., mill \$2 a ton		
over Pittsburgh, and Birmingham mill \$3 a		
ton over Pittsburgh.		

RAILS AND TRACK SUPPLIES

Rails

Per Gross Ton	
Standard, f.o.b. mill	\$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

Track Equipment

Base per 100 Lb.	
Spikes, ½-in. and larger	\$2.60
Spikes, ¾-in. and larger	2.60
Spikes, boat and barge	2.80

Tie plate, steel.....	1.85
Angle bars.....	2.75
Track bolts, to steam railroads.....	3.50
Track bolts, to jobbers, all sizes, per 100 count.....	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or
Chicago)

	Per Cent Off List
*Machine bolts.....	73, 10 and 10 to 75
Carriage bolts.....	73, 10 and 10 to 75
Lag bolts.....	73, 10 and 10 to 75
Plow bolts, Nos. 1, 2, 3 and 7 heads,	73, 10 and 10 to 75
Hot-pressed nuts, blank or tapped, square,	73, 10 and 10 to 75
Hot-pressed nuts, blank or tapped, hexagons,	73, 10 and 10 to 75
C.p.c. and t. square or hex. nuts, blank or	tapped.....
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including
¾ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

Per Cent Off List	
Semi-finished hexagon nuts	73, 10 and 10 to 75
Semi-finished hexagon castellated nuts, S.A.E.,	73, 10 and 10 to 75
Stove bolts in packages, P'gh.	85 and 10
Stove bolts in packages, Ch'go.	85 and 10
Stove bolts in pkgs., Cleveland.	85 and 10
Stove bolts in bulk, P'gh.	85, 10 and 2½
Stove bolts in bulk, Ch'go.	85, 10 and 2½
Stove bolts in bulk, Cleveland.	85, 10 and 2½
Tire bolts	60, 10 and 10

Discounts of 73, 10 and 10 per cent off on bolts
and nuts apply on carload business with jobbers
and large consumers.

Large Rivets

Base per 100 Lb.	
F.o.b. Pittsburgh or Cleveland	\$2.25
F.o.b. Chicago	2.35

Small Rivets

Per Cent Off List	
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened,	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread,	85, 10 and 10
Upset hex. cap screws, S.A.E. thread	85, 10 and 10
Upset set screws	80, 10 and 5
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pitts- burgh	\$27.00
Rerolling, 4-in. and under 10-in., Youngs- town	27.00
Rerolling, 4-in. and under 10-in., Cleve- land	27.00
Rerolling, 4-in. and under 10-in., Chicago.	29.00
Forging quality, Pittsburgh.....	\$33.00 to 34.00
Forging quality, Youngstown.....	33.00

Sheet Bars

Per Gross Ton	
Pittsburgh	\$26.00 to 27.00
Youngstown	26.00 to 27.00
Cleveland	26.00

Slabs

Per Gross Ton	
Pittsburgh	\$27.00
Youngstown	27.00
Cleveland	27.00

Skelp

Per Lb.	
Grooved	1.50c. to 1.60c.
Universal	1.50c. to 1.60c.
Sheared	1.50c. to 1.60c.

Wire Rods

Per Gross Ton	
Pittsburgh	\$37.00
Cleveland	37.00
Chicago	38.00

Coke

		Per Net Ton
Furnace, f.o.b. Connellsville	prompt	\$2.25
Foundry, f.o.b. Connellsville	prompt	\$3.25 to 4.50
Foundry, by-product, Ch'go ovens		7.50
Foundry, by-product, New Eng-land, del'd		10.50
Foundry, by-product, Newark or Jersey City, delivered		8.70 to 9.10
Foundry, by-product, Phila.		9.00
Foundry, by-product, Cleveland, delivered		8.27

Foundry, Birmingham.....	5.00
Foundry, by-product, St. Louis, f.o.b. ovens.....	8.00
Foundry, by product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to 1.60
Gas coal, ¾-in., f.o.b. Pa. mines.....	\$1.70 to \$1.80
Mine run gas coal, f.o.b. Pa. mines.	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines.....	0.40 to 0.60
Gas slack, f.o.b. W. Pa. mines.....	0.65 to 0.75

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	3.50c.
No. 4 industrial	3.00c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	3.50c.
No. 4 industrial	3.25c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	2.75c.
No. 5 industrial fuel oil	2.60c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	4.75c.
No. 4 distillate	4.00c.

REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works	
High-Heat	Intermediate
Duty Brick	Duty Brick
Pennsylvania	\$38.00 \$25.00 to \$30.00
Maryland	38.00 25.00 to 30.00
New Jersey	\$44.00 to 57.00
Ohio	38.00 25.00 to 30.00
Kentucky	38.00 25.00 to 30.00
Missouri	35.00 30.00

Illinois	38.00	25.00 to 30.00
Ground fire clay, per ton.....	6.50	

Chrome Brick

Per Net Ton	
Standard size	\$42.50

Silica Brick

Per 1000 f.o.b. Works	
Pennsylvania	\$38.00
Chicago	47.00

Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

		Per Net Ton
Standard sizes, f.o.b.	Baltimore and	
Chester, Pa.		\$61.50
Grain magnesite, f.o.b.	Baltimore and	
Chester, Pa.		38.50
Domestic, f.o.b.	Chewelah, Wash.	20.90

CAST IRON PIPE

Per Net Ton	
6-in. and larger, del'd Chicago	\$40.40 to \$41.40
4-in., del'd Chicago	43.40 to 44.40

6-in. and larger, del'd New York	\$29.20
4-in., del'd New York	32.20
6-in. and larger, Birmingham	\$32.00 to 33.00

4-in., Birmingham	\$35.00 to \$36.00
Class "A" and gas pipe, \$3 extra	

Pig Iron Prices for All Districts

▶ VALLEY ◀

Per gross ton, f.o.b. Valley furnace:

Basic	\$14.50
Bessemer	15.50
Gray forge	15.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.50
Low phos., copper free	25.00

Freight rate to Pittsburgh or Cleveland district, \$1.89.

▶ PITTSBURGH ◀

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	\$15.00
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.00
Bessemer	16.00

Freight rates to points in Pittsburgh district range from 69c. to \$1.26.

▶ CHICAGO ◀

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	\$16.50
N'th'n No. 1 fdy.	17.00
Malleable, not over 2.25 sil.	16.50
High phosphorus	16.50
Lake Super. charcoal, sil.	
1.50, by rail	23.17
S'th'n No. 2 fdy.	16.14
Low phos., sil. 1 to 2, cop-	
per free	\$28.50 to 29.20
Silvery, sil. 8 per cent.	23.67
Bess. ferrosilicon, 15 per	
cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

▶ ST. LOUIS ◀

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd St. Louis	18.80
Southern No. 2 fdy., del'd	\$14.56 to 15.56
Northern malleable, del'd	18.80
Northern basic, del'd	18.80

Freight rates 83c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

▶ NEW YORK ◀

Per gross ton, delivered New York district:

*Buffalo, No. 2, del'd east.	
N. J.	\$17.91 to \$18.41
East. Pa. No. 2 fdy.	17.02 to 17.52
East. Pa. No. 2X fdy.	17.52 to 18.02

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.41 a ton from Buffalo.

▶ BUFFALO ◀

Per gross ton, f.o.b. furnace:

No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal	23.41

▶ NEW ENGLAND ◀

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	\$20.04
*Buffalo, sil. 2.25 to 2.75	20.04
*Ala., sil. 1.75 to 2.25	19.74
*Ala., sil. 2.25 to 2.75	20.24
*Ala., sil. 1.75 to 2.25	15.88
*Ala., sil. 2.25 to 2.75	16.28

Freight rates: \$5.04 all rail from Buffalo; \$9.75 all rail from Alabama and \$5.88 rail and water from Alabama to New England seaboard.

*All rail rate.
†Rail and water rate.

▶ CINCINNATI ◀

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	\$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	\$17.51 to 18.01
S'th'n Ohio silvery, 8 per cent.	22.01

Freight rates, \$2.02 from Ironton and Jackson, Ohio; \$3.81 from Birmingham.

▶ PHILADELPHIA ◀

Per gross ton at Philadelphia:

East. Pa. No. 2	\$15.64 to \$16.14
East. Pa. No. 2X	16.14 to 16.64
East. Pa. No. 1X	16.64 to 17.14
Basic (del'd east. Pa.)	16.26
Malleable	18.00 to 18.50
Stand. low phos. (f.o.b.	
east. Pa. furnace)	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b.	
furnace)	22.00 to 22.50
Va. No. 2 plain	22.04
Va. No. 2X	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 84c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

▶ CLEVELAND ◀

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	\$16.00
S'th'n fdy., sil. 1.75 to 2.25	16.14
Malleable (local delivery)	16.00
Ohio silvery, 8 per cent.	21.87
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 55c. average local switching charge; \$3.12 from Jackson, Ohio; \$6.14 from Birmingham.

▶ BIRMINGHAM ◀

Per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	11.00

▶ CANADA ◀

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

Prices of Ores, Ferroalloys and Fluorspar

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Per Gross Ton	
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, aver. 68% iron	9.00c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic and foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50-52%	23c. to 24c.
Manganese, Brazilian, 46 to 48%	22c. to 23c.
Tungsten, Chinese wolframite	\$11.00 to \$11.25
Tungsten, domestic scheelite	9.50 to 10.00

Per Gross Ton	
Chrome, 45% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$18.00
Chrome, 48% Cr ₂ O ₃ , c.i.f. Atlantic seaboard	20.00

Ferromanganese

Per Gross Ton	
Domestic, 80%, seaboard	\$72.00 to \$75.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*72.00 to 75.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	\$26.00 to \$27.00
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Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	\$77.50
50% (less carload)	85.00
75% (carloads)	126.00
75% (less carloads)	136.00
14% to 16% (f.o.b. Welland, Ont., in carloads)	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	\$20.50	14%	\$23.50
11%	21.00	15%	24.00
12%	21.50	16%	25.00
13%	22.50	17%	26.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	\$18.00	12%	\$20.50
7%	18.50	13%	21.50
8%	18.75	14%	22.50
9%	19.00	15%	23.00
10%	19.50	16%	24.00
11%	20.00	17%	25.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	\$1.08
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	23.50c. to 25.00c.
Ferrochromium, 0.06% carbon	25.50c. to 27.00c.
Ferrovanadium, del., per lb. contained Va.	\$3.05 to \$3.30
Ferrocobaltititanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18% Rockdale, Tenn., base per gross ton	91.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	\$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered: 2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	\$5 a ton higher

Fluorspar

Per Net Ton

Domestic, washed gravel, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	\$20.31
No. 2 lump, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	22.31
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	\$17.00 to 17.40
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	32.00

Old Material Quotations

► PITTSBURGH ◀

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel...	\$10.00 to \$10.50
No. 2 heavy melting steel...	9.00 to 9.50
No. 2 railroad wrought...	10.00 to 10.50
Scrap rails	10.00 to 10.50
Rails 3 ft. and under...	12.00 to 12.50
Sheet bar crops, ordinary...	11.00 to 11.50
Compressed sheet steel...	9.50 to 10.00
Hand bundled sheet steel...	8.50 to 9.00
Hvy. steel axle turnings...	9.00 to 9.50
Machine shop turnings...	6.50 to 7.00
Short shov. steel turnings...	6.50 to 7.00
Short mixed borings and turnings	6.50 to 7.00
Cast iron borings...	6.50 to 7.00
Cast iron car wheels...	10.50 to 11.00
Heavy breakable cast...	8.00 to 8.50
No. 1 cast...	9.50 to 10.00
Railr. knuckles and couplers	10.50 to 11.50
Rail. coil and leaf springs	10.50 to 11.50
Rolled steel wheels...	10.50 to 11.50
Low phos. billet crops...	13.00 to 13.50
Low phos. sheet bar crops...	12.50 to 13.00
Low phos. plate scrap...	10.50 to 11.50
Low phos. punchings...	10.50 to 11.50
Steel car axles...	15.00 to 15.50

► CHICAGO ◀

Delivered Chicago district consumers:

Per Gross Ton

Heavy melting steel...	\$7.00 to \$7.25
Shoveling steel...	7.00 to 7.25
Frogs, switches and guards	7.00 to 7.25
Hydraulic comp. sheets...	5.75 to 6.25
Drop forge flashings...	5.00 to 5.50
No. 1 busheling...	5.00 to 5.50
Rolled car wheels...	8.00 to 8.50
Railroad tires...	9.00 to 9.50
Railroad leaf springs...	8.50 to 9.00
Axle turnings...	5.75 to 6.25
Steel couplers and knuckles	8.25 to 8.75
Coil springs...	9.50 to 10.00
Axle turnings (elec. fur.)...	6.00 to 6.50
Low phos. punchings...	9.50 to 10.00
Low phos. plates, 12 in. and under	9.00 to 9.50
Cast iron borings...	4.50 to 5.00
Short shoveling turnings...	4.50 to 5.00
Machine shop turnings...	4.00 to 4.50
Rerolling rails...	10.50 to 11.00
Steel rails, less than 3 ft.	9.25 to 9.75
Steel rails, less than 2 ft.	10.00 to 10.50
Angle bars, steel...	8.25 to 8.75
Cast iron car wheels...	7.50 to 8.00
Railroad malleable...	7.00 to 7.50
Agricultural malleable...	7.00 to 7.50
*Relaying rails, 56 to 60 lb.	19.00 to 21.00
*Relay. rails, 65 lb. and up	22.00 to 27.00

Per Net Ton

Iron angle and splice bars...	\$7.00 to \$7.50
Iron arch bars, transoms...	7.00 to 7.50
Iron car axles...	13.00 to 14.00
Steel car axles...	10.25 to 10.75
No. 1 railroad wrought...	5.50 to 6.00
No. 2 railroad wrought...	6.25 to 6.50
No. 1 busheling...	4.75 to 5.25
No. 2 busheling...	2.50 to 3.00
Locomotive tires, smooth...	8.00 to 9.00
Pipes and flues...	3.25 to 3.75
No. 1 machinery cast...	7.50 to 8.00
Clean automobile cast...	7.25 to 7.75
No. 1 railroad cast...	6.00 to 6.50
No. 1 agricultural cast...	6.25 to 6.75
Stove plate...	5.75 to 6.25
Grate bars...	5.50 to 6.00
Brake shoes...	6.50 to 7.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

► PHILADELPHIA ◀

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel...	\$7.00 to \$7.75
No. 2 heavy melting steel...	5.50 to 6.00
No. 1 railroad wrought...	8.50 to 9.00
Bundled sheets...	6.00
Hydraulic compressed, new	6.50 to 7.00
Hydraulic compressed, old...	5.50 to 6.00
Machine shop turnings...	4.00 to 4.50
Heavy axle turnings...	6.00 to 6.50
Cast borings (nom.)...	3.50
Heavy breakable cast...	9.00
Stove plate (steel works)...	7.00
No. 1 low phos. hvy...	10.00 to 11.00
Couplers and knuckles...	8.50 to 9.00
Rolled steel wheels...	8.50 to 9.00
No. 1 blast furnace...	3.50
Spec. iron and steel pipe...	10.50
Shafting...	13.50 to 14.00
Steel axles...	14.50 to 15.00
No. 1 forge fire...	6.00
Cast iron car wheels...	10.00 to 10.50
No. 1 cast...	10.00 to 10.50
Cast borings (chem.)...	11.50 to 12.00
Steel rails for rolling...	10.50

► CLEVELAND ◀

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel...	\$7.50 to \$8.00
No. 2 heavy melting steel...	6.75 to 7.25
Compressed sheet steel...	7.00 to 7.25
Light bundled sheet stampings	6.00 to 6.50
Drop forge flashings...	6.00 to 6.25
Machine-shop turnings...	4.25 to 4.50
Short shoveling turnings...	5.75 to 6.25
No. 1 busheling...	6.50 to 6.75
Steel axle turnings...	7.50 to 8.00
Low phos. billet crops...	14.00 to 14.50
Cast iron borings...	5.75 to 6.00
Mixed borings and short turnings	5.75 to 6.00
No. 2 busheling...	5.75 to 6.00
No. 1 cast...	9.00 to 9.50
Railroad grate bars...	6.00 to 6.50
Stove plate...	6.00 to 6.50
Rails under 3 ft...	12.00 to 12.50
Rails for rolling...	11.00 to 12.00
Railroad malleable...	9.50 to 10.00

► BUFFALO ◀

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel...	\$8.00
No. 2 heavy melting scrap...	6.50
Scrap rails...	\$8.00 to 8.50
New hydraulic comp. sheets	6.50
Old hydraulic comp. sheets	5.50
Drop forge flashings...	6.50
Hvy. steel axle turnings...	6.50 to 7.00
Machine shop turnings...	5.00
Knuckles and couplers...	10.00
Coil and leaf springs...	10.00
Rolled steel wheels...	10.00
Low phos. billet crops...	12.00 to 12.50
Short shov. steel turnings...	6.50 to 7.00
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings...	6.00 to 6.50
No. 2 busheling...	5.50 to 6.00
Steel car axles...	10.00 to 11.00
Iron axles...	12.00 to 12.50
No. 1 machinery cast...	9.25 to 9.75
No. 1 cupola cast...	8.50 to 9.00
Stove plate...	8.25 to 8.75
Steel rails, 3 ft. and under	11.50 to 12.00
Cast iron car wheels...	9.00 to 9.50
Industrial malleable...	9.00 to 9.50
Railroad malleable...	9.00 to 9.50
Chemical borings...	8.50 to 9.00

► BIRMINGHAM ◀

Per gross ton delivered consumers' yards:

Heavy melting steel...	\$7.50 to \$8.00
Scrap steel rails...	8.00 to 8.50
Short shoveling turnings...	3.50 to 4.00
Stove plate...	6.00
Steel axles...	12.00
Iron axles...	12.00
No. 1 railroad wrought...	6.00
Rails for rolling...	9.00 to 9.50
No. 1 cast...	9.00
Tramcar wheels...	8.50
Cast iron borings, chem...	8.50

► ST. LOUIS ◀

Dealers' buying prices per gross ton:

Selected heavy steel...	\$7.00 to \$7.50
No. 1 heavy melting...	6.25 to 6.75
No. 2 heavy melting...	5.75 to 6.25
No. 1 locomotive tires...	6.50 to 7.00
Misc. stand-sec. rails...	7.50 to 7.75
Railroad springs...	8.50 to 9.00
Bundled sheets...	4.25 to 4.75
No. 2 railroad wrought...	6.25 to 6.75
No. 1 busheling...	5.75 to 6.25
Cast iron borings and shoveling turnings	4.75 to 5.25
Iron rails...	7.00 to 8.00
Rails for rolling...	9.25 to 9.75
Machine shop turnings...	3.00 to 3.50
Heavy turnings...	5.50 to 6.00
Steel car axles...	9.50 to 10.00
Iron car axles...	14.00 to 14.50
Wrot. iron bars and trans.	5.00 to 5.50
No. 1 railroad wrought...	4.75 to 5.25
Steel rails, less than 3 ft.	10.00 to 10.50
Steel angle bars...	6.50 to 7.00
Cast iron car wheels...	6.50 to 7.00
No. 1 machinery cast...	8.00 to 8.50
Railroad malleable...	5.00 to 5.50
No. 1 railroad cast...	6.25 to 6.75
Stove plate...	6.00 to 6.50
Relay. rails, 60 lb. and under	16.00 to 16.50
Relay. rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable...	5.00 to 5.50

► NEW YORK ◀

Dealers' buying prices per gross ton:

No. 1 heavy melting steel...	\$4.25 to \$5.50
No. 2 heavy melting steel...	3.75 to 4.50
Heavy melting steel (yard)	2.75 to 3.00
No. 1 hvy. breakable cast...	5.00 to 5.50
Stove plate (steel works)...	3.00 to 3.50
Machine shop turnings...	1.00 to 1.50
Short shoveling turnings...	1.00 to 1.50
Cast borings...	1.00 to 1.50
No. 1 blast furnace...	1.00 to 1.50
Steel car axles...	10.00 to 10.50
Iron car axles (nom.)...	14.00 to 14.50
Spec. iron and steel pipe...	5.00
Forge fire...	3.25
No. 1 railroad wrought...	5.00 to 5.25
No. 1 yard wrought, long...	4.00 to 4.25
Rails for rolling...	6.00 to 6.25
Stove plate (foundry)...	4.75 to 5.25
Malleable cast (railroad)...	6.00 to 6.50
Cast borings (chemical)...	8.00 to 8.50

Per gross ton, delivered local foundries:

No. 1 machinery cast...	\$8.50
No. 1 hvy. cast (cupola size)...	7.50
No. 2 cast...	6.50

► BOSTON ◀

Dealers' buying prices per gross ton:

No. 1 heavy melting steel...	\$4.00 to \$4.25
Scrap T rails...	3.80 to 4.60
Machine shop turnings...	1.05
Cast iron borings...	1.05
Bundled skeleton, long...	2.50
Forge flashings...	3.00 to 3.50
Blast furnace scrap...	1.05
Forge scrap...	3.00 to 3.25
Shafting...	9.50 to 10.00
Steel car axles...	9.00 to 9.50
Wrought pipe...	4.00 to 4.25
Rails for rolling...	6.00 to 6.50
Cast iron borings, chemical	7.00 to 7.25

Per gross ton delivered consumers' yards:

Textile cast...	\$8.75 to \$9.25
No. 1 machinery cast...	8.75 to 9.25
Stove plate...	5.00 to 5.25
Railroad malleable...	10.50 to 11.00

► CINCINNATI ◀

Dealers' buying prices per gross ton:

Heavy melting steel...	\$6.00 to \$7.00
Scrap rails for melting...	8.00 to 8.50
Loose sheet clippings...	2.25 to 2.75
Bundled sheets...	4.75 to 5.25
Cast iron borings...	2.75 to 3.25
Machine shop turnings...	3.25 to 3.75
No. 1 busheling...	4.25 to 4.75
No. 2 busheling...	2.50 to 3.00
Rails for rolling...	9.00 to 9.50
No. 1 locomotive tires...	8.50 to 9.00
Short rails...	11.75 to 12.25
Cast iron car wheels...	8.25 to 8.75
No. 1 machinery cast...	10.00 to 10.50
No. 1 railroad cast...	8.75 to 9.25
Burnt cast...	4.25 to 4.75
Stove plate...	4.25 to 4.75
Agricultural malleable...	8.00 to 8.50
Railroad malleable...	9.00 to 9.50

► DETROIT ◀

Dealers' buying prices per gross ton:

Hvy. melting...	\$5.75 to \$6.25
Borings and short turnings	4.00 to 4.50
Long turnings...	3.25 to 3.75
No. 1 machinery cast...	8.50 to 9.00
Automotive cast...	10.75 to 11.25
Hydraul. comp. sheets...	5.75 to 6.25
Stove plate...	4.50 to 5.00
New No. 1 busheling...	4.75 to 5.25
Old No. 2 busheling...	3.00 to 3.50
Sheet clippings...	3.25 to 3.75
Flashings...	4.75 to 5.25

► CANADA ◀

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel...	\$7.00	\$6.00
Rails, scrap...	7.00	8.00
No. 1 wrought...	6.00	8.00
Machine shop turnings...	2.00	2.00
Boiler plate...	5.00	4.50
Heavy axle turnings...	2.50	2.50
Cast borings...	2.00	2.00
Steel borings...	2.00	2.00
Wrought pipe...	2.00	2.00
Steel axles...	7.00	9.00
Axles, wrought iron...	7.00	11.00
No. 1 machinery cast...	12.50	10.00
Stove plate...	10.00	8.00
Standard car wheels...	11.00	8.50
Malleable...	10.00	8.00

▲▲▲ Warehouse Prices for Iron and Steel Products ▲▲▲

► CHICAGO ◀

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.75c.
Reinforcing bars, billet steel.....	1.75c.
Rail steel reinforcement—	
For buildings.....	1.55c.
Road slabs, bridges, culverts.....	1.40c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.10c.
Flats and squares.....	3.60c.
Bands, $\frac{1}{4}$ in. (In. Nos. 10 and 12 gages).....	2.95c.
Hoops (No. 14 gage and lighter).....	3.50c.
Hot-rolled annealed sheets (No. 24).....	3.55c.
Galv. sheets (No. 24).....	4.10c.
Hot-rolled sheets (No. 10).....	3.20c.
Spikes ($\frac{1}{4}$ in. and lighter).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	3.75c.
Rivets, boiler.....	3.75c.
Per Cent Off List	
Machine bolts.....	73
Carriage bolts.....	73
Coach and lag screws.....	73
Hot-pressed nuts, sq., tap. or blank.....	73
Hot-pressed nuts, hex., tap. or blank.....	73
No. 8 black ann'l'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c'd nails, base per keg.....	2.30

► CLEVELAND ◀

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.75c.
Reinforc. steel bars.....	1.75c. to 1.95c.
Cold-fin. rounds and hex.....	3.10c.
Cold-fin. flats and sq.....	3.60c.
Hoops and bands, No. 12 to $\frac{1}{4}$ in., inclusive.....	3.00c.
Hoops and bands, No. 13 and lighter.....	3.55c.
Cold-finished strip.....	5.55c.
Hot-rolled annealed sheets (No. 24).....	3.25c.
Galvanized sheets (No. 24).....	3.75c.
Hot-rolled sheets (No. 10).....	3.00c.
Black ann'l'd wire, per 100 lb.....	\$2.75
No. 9 galv. wire, per 100 lb.....	3.20
Com. wire nails, base per keg.....	2.35

*Net base, including boxing and cutting to length.

► CINCINNATI ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
New billet reinforc. bars.....	3.00c.
Rail steel reinforc. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.20c.
Cold-fin. rounds and hex.....	3.50c.
Squares.....	4.00c.
Hot-rolled annealed sheets (No. 24).....	3.75c.
Galv. sheets (No. 24).....	4.25c.
Hot-rolled sheets (No. 10).....	3.30c.
Structural rivets.....	4.20c.
Small rivets.....	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (10 to 49 kegs).....	2.65
Larger quantities.....	2.50
Cement c'd nails, base 100-lb. keg.....	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Seamless steel boiler tubes, 2-in.....	\$17.50
4-in.....	36.00
Lap-welded steel boiler tubes, 2-in.....	16.50
4-in.....	34.50

► BUFFALO ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.00c.
Reinforcing bars.....	2.65c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.25c.
Hot-rolled annealed sheets (No. 24).....	3.70c.
Galv. sheets (No. 24).....	4.10c.
Bands.....	3.35c.
Hoops.....	3.90c.
Hot-rolled sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$2.45
Black wire, base per 100 lb.....	3.20

► NEW YORK ◀

	Base per Lb.
Plates and struc. shapes.....	2.70c. to 3.10c.
Soft steel bars, small shapes.....	2.70c. to 3.10c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal.....	6.00c. to 6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard.....	4.95c.
Hoops.....	3.75c.
Bands.....	3.40c.
Hot-rolled sheets (No. 10).....	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*).....	3.60c.
Galvanized sheets (No. 24*).....	4.00c.
Long terme sheets (No. 24).....	5.00c.
Standard tool steel.....	12.00c.
Wire, black annealed (No. 10).....	3.60c.
Wire, galv. annealed (No. 10).....	4.05c.
Tire steel, $\frac{1}{2}$ x $\frac{1}{4}$ in. and larger.....	3.40c.
Smooth finish, 1 to 2 $\frac{1}{4}$ x $\frac{1}{4}$ in. and larger.....	3.75c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.
Common wire nails, base, per keg.....	\$2.60
Per Cent Off List	
Machine bolts, cut thread:	
$\frac{1}{4}$ x 6 in. and smaller.....	.65 to .65 and 10
1 x 30 in. and smaller.....	.65 to .65 and 10
Carriage bolts, cut thread:	
$\frac{1}{4}$ x 6 in. and smaller.....	.65 to .65 and 10
$\frac{1}{4}$ x 20 in. and smaller.....	.65 to .65 and 10
Boiler Tubes:	
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

► ST. LOUIS ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
Cold-fin. rounds, shafting, screw stock.....	3.35c.
Hot-rolled annealed sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Hot-rolled sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	3.85c.
Galv. corrug. sheets.....	4.40c.
Structural rivets.....	4.00c.
Boiler rivets.....	4.00c.
Per Cent Off List	
Tank rivets, $\frac{1}{4}$ -in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	73
Carriage bolts.....	73
Lag screws.....	73
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63

► PACIFIC COAST ◀

	Base per Lb.—		
	San Fran.	Los Angeles	Seattle
Plates and struc. shapes, $\frac{1}{4}$ -in. and heavier.....	2.80c.	3.00c.	2.50c.
Soft steel bars.....	2.80c.	3.00c.	2.50c.
Reinforcing bars.....	2.80c.	2.80c.	3.00c.
Hot-rolled annealed sheets (No. 24).....	3.90c.	3.90c.	4.00c.
Hot-rolled sheets (No. 10).....	3.40c.	3.35c.	3.50c.
Galv. sheets (No. 24).....	4.40c.	4.20c.	4.50c.
Struc. rivets, $\frac{1}{2}$ in. and larger, less than 1000 lb.....	5.00c.	5.00c.	4.00c.
Cold-finished steel bars and shafting:			
Rounds.....	5.25c.	5.00c.	4.25c.
Square and hexagon.....	6.25c.	6.50c.	5.50c.
Flats.....	6.75c.	6.50c.	6.50c.
Common wire nails, base per keg in less carloads.....	\$2.75	\$2.75	\$2.75
Plates, shapes, bars, bands and hot-rolled sheets, No. 16 gage and heavier, subject to group differentials.			
Cold-finished steel bars and shafting, subject to warehouse differentials for quantity.			
All prices f.o.b. warehouse.			

► PITTSBURGH ◀

	*Base per Lb.
Plates.....	2.85c.
Structural shapes.....	2.85c.
Soft steel bars and small shapes.....	2.60c.
Reinforcing steel bars.....	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.10c.
Squares and flats.....	3.60c.
Bands.....	2.95c.
Hoops.....	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles.....	3.05c.
Galv. sheets (No. 24), 25 or more bundles.....	3.65c.
Hot-rolled sheets (No. 10).....	3.15c. to 3.20c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.).....	3.74c.
Spikes, large.....	2.50c.
Small.....	2.75c. to 2.90c.
Boat.....	3.00c.
Track bolts, all sizes, per 100 count, 70 and 10 per cent off list	
Machine bolts, 100 count, 70 and 10 per cent off list	
Carriage bolts, 100 count, 70 and 10 per cent off list	
Nuts, all styles, 100 count, 73 and 10 per cent off list	
Large rivets, base per 100 lb.....	\$3.00
Wire, black, soft ann'l'd, base per 100 lb.....	2.30
Wire, galv. soft, base per 100 lb.....	2.75
Common wire nails, per keg.....	2.25
Cement coated nails, per keg.....	2.25

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

► PHILADELPHIA ◀

	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier.....	2.45c.
Structural shapes.....	2.45c.
Soft steel bars, small shapes, iron bars (except bands).....	2.45c.
Reinforc. steel bars, sq., twisted and deform.....	2.30c.
Cold-fin. steel, rounds and hex.....	3.30c.
Cold-fin. steel, sq. and flats.....	3.80c.
Steel hoops.....	3.00c.
Steel bands, No. 12 to $\frac{1}{4}$ -in., incl.....	2.75c.
Spring steel.....	5.00c.
Hot-rolled annealed sheets (No. 24).....	3.55c.
Galvanized sheets (No. 24).....	3.75c.
Hot-rolled and annealed sheets (No. 10).....	3.05c.
Diam. pat. floor plates, $\frac{1}{4}$ in.....	5.00c.
Swedish iron bars.....	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

► BOSTON ◀

	Base per Lb.
Plates.....	*3.35c.
Structural shapes.....	*3.35c.
Soft steel bars, small shapes.....	*3.25c.
Reinforcing bars.....	3.10c. to 3.25c.
Iron bars—	
Refined.....	3.25c.
Best refined.....	4.60c.
Spring steel, open-hearth.....	5.00c.
Tire steel.....	4.50c. to 4.75c.
Bands.....	*3.75c. to 4.25c.
Hoop steel.....	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.50c.
Squares and flats.....	4.00c. to 6.00c.
Rivets, structural or boiler.....	4.80c.
Per Cent Off List	
Machine bolts.....	70
Carriage bolts.....	70
Lag screws.....	70
Hot-pressed nuts.....	40 and 10
Cold-punched nuts.....	40 and 10
Stove bolts.....	70 and 10

*Base price (250 to 999 lb.): less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

Copper Buying Light, Prices Unchanged; Tin, Lead and Zinc Are Steady

NEW YORK, Feb. 23.—Demand for electrolytic copper is exceptionally light. Primary producers are quoting 6.50c. a lb., delivered Connecticut Valley, while custom smelters are naming 6.25c., delivered. Sales in the past week were chiefly for spot shipment. The leading interests are exerting little pressure, however, to sell for forward delivery at present prices.

Foreign demand is quiet, with sales in the past week totaling only 1500 tons, bringing the total export sales so far this month to about 23,000 tons. Copper Exporters, Inc., continues to quote 6.62½c. a lb., c.i.f. usual European ports. Several car lot sales of Lake copper have been made at 6.50c., delivered.

The outcome of the informal discussion this week among the Belgian representatives of the Union Minière du Haut Katanga, owner of the largest copper mines in Africa, and New York copper producers is awaited with keen interest. An agreement in-

volving revision of regulations governing foreign sales of copper through Copper Exporters, Inc., and the further curtailment of production may result from the discussion.

Lead

Consumers are still hesitant about covering forward requirements. A moderate amount of March business has been placed, but the bulk of current orders is for spot delivery. Prices are firm at 3.75c., New York, and 3.55c., St. Louis.

Tin

Spot buying by consumers continues in light volume. Interest in futures is practically non-existent. Prices, however, are being well maintained, with today's quotation 22.25c. a lb. The London market today is £139 15s. a ton for spot standard, £142 2s. 6d. for future standard and £142 12s. 6d. for spot Straits. The Singapore market today is £146 7s. 6d. Straits shipments of tin up to and

including Feb. 20 were 3125 tons. Warehouse stocks in the United Kingdom decreased 39 tons last week to 33,241 tons.

Zinc

Although activity in the past week diminished somewhat from that in the preceding week, a relatively fair amount of buying was transacted both for spot and future delivery. Prices are fairly steady, with the current quotation generally maintained at 2.82½c., East St. Louis, or 3.19½c., New York.

Antimony

A slight improvement in spot demand has advanced the price of antimony to 6.75c. a lb., duty paid, New York. Demand for futures is dormant, and the price for forward shipment is nominal at 4.50c., c.i.f. New York.

Republic Steel's Loss \$9,034,152 in 1931

Republic Steel Corp'n. reports a net loss of \$9,034,152 in 1931. This included \$300,000 in dividends on preferred stock of Trumbull-Cliffs Furnace Co. This compares with a loss of \$3,522,003 in 1930. Operating profit last year was \$3,020,540 and this, with other income, made a total of \$4,574,745. Plant depreciation and exhaustion of minerals amounted to \$7,636,406 and interest charges were \$3,609,069.

Cincinnati Milling Machine Co. and Cincinnati Grinders, Inc., Cincinnati, have established direct sales representation in the Pittsburgh district, this move having previously been made in the Detroit, Chicago, Cleveland and Cincinnati districts.

American Steel Foundries reports net loss of \$791,373 for 1931, compared with a net profit of \$2,801,442 for 1930. Operating earnings, before depreciation, last year amounted to \$8,595, against \$3,921,874 in the preceding year.

Shipments of industrial trucks and tractors in 1931 totaled 633 units, against 1223 in 1930, according to reports received by the Bureau of the Census from 10 manufacturers. The December, 1931, output was 22, an increase of one over November.

The Week's Prices. Cents Per Pound for Early Delivery

	Feb. 17	Feb. 18	Feb. 19	Feb. 20	Feb. 23
Lake copper, New York.....	6.62½	6.62½	6.62½	6.62½	6.50
Electrolytic copper, N. Y.*.....	6.00	6.00	6.00	6.00	6.00
Straits tin, spot, N. Y.....	22.12½	22.15	22.35	22.35	22.25
Zinc, East St. Louis.....	2.82½	2.85	2.85	2.85	2.82½
Zinc, New York.....	3.19½	3.22	3.22	3.22	3.19½
Lead, St. Louis.....	3.55	3.55	3.55	3.55	3.55
Lead, New York.....	3.75	3.75	3.75	3.75	3.75

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.
Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.75c. a lb., New York.
Brass ingots, 85-5-5-5, 6.37½c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig.....	24.00c. to 25.00c.
Tin, bar.....	26.00c. to 28.00c.
Copper, Lake.....	8.50c. to 9.50c.
Copper, electrolytic.....	8.25c. to 9.25c.
Copper, casting.....	8.00c. to 9.00c.
*Copper sheets, hot-rolled.....	15.87½c.
*High brass sheets.....	12.87½c.
*Seamless brass tubes.....	16.12½c.
*Seamless copper tubes.....	15.37½c.
*Brass rods.....	10.62½c.
*Braze brass tubes.....	22.00c.
Zinc, slab.....	4.75c. to 5.25c.
Zinc sheets (No. 9), casks.....	9.25c. to 9.50c.
Lead, American pig.....	4.50c. to 5.00c.
Lead, bar.....	6.25c. to 7.25c.
Lead sheets.....	8.00c.
Antimony, Asiatic.....	9.00c. to 10.00c.
Alum., virgin, 99 per cent plus.....	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent.....	17.00c. to 18.00c.
Solder, ½ and ½.....	15.25c. to 16.25c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	26.25c.
Tin, bar.....	28.25c.

Copper, Lake.....	7.87½c.
Copper, electrolytic.....	7.87½c.
Copper, casting.....	7.50c.
Zinc, slab.....	4.25c. to 4.50c.
Lead, American pig.....	4.30c. to 4.50c.
Lead, bar.....	7.75c.
Antimony, Asiatic.....	10.00c.
Babbitt metal, medium grade.....	15.00c.
Babbitt metal, high grade.....	29.75c.
Solder, ½ and ½.....	17.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	4.75c.	5.50c.
Copper, hvy. and wire	4.50c.	5.25c.
Copper, light and bottoms.....	3.50c.	4.25c.
Brass, heavy.....	2.25c.	2.75c.
Brass, light.....	1.75c.	2.50c.
Hvy. machine composition.....	3.50c.	4.25c.
No. 1 yel. brass turnings.....	2.50c.	3.00c.
No. 1 red brass or compos. turnings.....	3.00c.	3.75c.
Lead, heavy.....	2.50c.	3.00c.
Zinc.....	1.00c.	1.50c.
Cast aluminum.....	3.25c.	5.00c.
Sheet aluminum.....	8.50c.	10.50c.

Fabricated Structural Steel

Awards of 9900 Tons Include 4000 Tons for a Viaduct—
New Projects of 10,700 Tons

INCLUDED in the week's awards of 9900 tons is 6500 tons for activities in the Central West. A viaduct at Justice Park, Ill., will take 4000 tons, the largest reported letting. A bridge at Trenton, N. J., calls for 1060 tons. New inquiries total 10,700 tons, of which 5500 tons is for a post office at Newark, N. J., 1000 tons for a highway bridge at Vandergrift, Pa., and 1000 tons for a bascule bridge at De Pere, Wis. Bids for 4500 tons for the Franklin Memorial, Philadelphia, were opened Feb. 24. Awards follow:

NORTH ATLANTIC STATES

Melrose, Mass., 160 tons, high school, to New England Structural Co.
New York, 300 tons, addition to New York Academy of Medicine, to Ingalls Iron Works.
Brooklyn, 220 tons, repairs to elevated railroad, to McClintic-Marshall Corp.
Lancaster, Pa., 240 tons, filtration plant, to A. B. Rote & Co.
Jackson Heights, N. Y., 280 tons, Blessed Sacrament school and parish house, to American Bridge Co.
Trenton, N. J., 1060 tons, Mercer County highway bridge 140.9-B., to American Bridge Co.; Parker & Graham, Inc., general contractor.
Philadelphia, 100 tons, trestle at Germantown station, to Morris Iron & Wire Works.
Philadelphia, 4500 tons, Franklin Memorial, previously reported as 3000 tons; bids opened Feb. 24.
Philadelphia, 250 tons, addition to Girard College library; general contract awarded to Turner Construction Co.
Wilmington, Del., 400 tons, office building for Delaware Power & Light Co., to McClintic-Marshall Corp.

CENTRAL STATES

Columbus, Ohio, 600 tons, grandstand addition for Columbus Baseball Club, to International-Stacey Corp.
Muskegon, Mich., 175 tons, car ferry apron, to Wisconsin Bridge Co.
Cook County, Ill., 150 tons, bridge, to Midland Structural Steel Co.
Youngstown, Ohio, 470 tons, post office, to Truscon Steel Co.
South Bend, Ind., 175 tons, Furnas ice cream plant, to McClintic-Marshall Corp.
Shoals, Ind., 550 tons, three 175-ft. trusses, to an unnamed fabricator.
Dearborn, Mich., 225 tons, Ford Motor Co. glass plant extension, to be fabricated in Ford plant.
East St. Louis, 160 tons, East Side levee bridge No. 2, to Missouri Bridge & Iron Co.
Justice Park, Ill., 4000 tons, viaduct, to McClintic-Marshall Corp.

WESTERN STATES

State of Utah, 105 tons, bridges, to Kansas City Structural Steel Co.
Berkeley, Cal., 100 tons, United Artists theater, to Herrick Iron Works.
Ione, Wash., 225 tons, bridge, to an unnamed bidder.
Oakland, Cal., 175 tons, transit shed extension, Moore Dry Dock Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

York, Me., 150 tons, State bridge.
Taunton, Mass., 100 tons, high school.
Newark, N. J., 5500 tons, post office.
Vandergrift, Pa., 1000 tons, State highway bridge; bids open Feb. 26.

THE SOUTH

Jackson, Miss., 120 tons, post office.

CENTRAL STATES

DePere, Wis., 1000 tons, bascule span over Fox River; bids about March 15.
Detroit, 7300 tons, post office; Great Lakes Construction Co., low bidder on general contract.
Minneapolis, 200 tons, power house addition for Minneapolis Street Railway Co.
State of Nebraska, 400 tons, highway bridge at Valentine.
State of Kansas, 235 tons, highway bridges; at Russell, 150 tons, Norton, 85 tons.
State of Illinois, 439 tons, highway bridges; Fulton County, 160 and 109 tons, Hancock County, 170 tons.
Cleveland, 200 tons, plant addition for Industrial Rayon Corp.

WESTERN STATES

Superior, Mont., 176 or 245 tons (alternate), bridge over Clock Fork River, bids opened Feb. 20.
Ione, Wash., 500 tons, office building.
Los Alamos, Cal., 140 tons, bridge over San Antonio Creek; Frederickson & Watson, low bidders.
Fairbanks, Alaska, 450 tons, post office; William MacDonald Construction Co., low bidder.
Fresno, Cal., 155 tons, to Belmont Avenue subway; Thompson Construction Co., low bidder.
Gladstone, Ore., 1000 tons, bridge over Clackamas River; bids close March 3.

FABRICATED PLATE

NEW PROJECTS

Pittsburgh, 150 tons, dredge for United States Engineer; bids open March 15.
Huntington, W. Va., 150 tons, derrick boat for United States Engineer; bids open March 17.
St. Louis, 200 tons, 20 pontoons for United States Engineer Office, bids open March 19.
Yakima, Wash., 182 tons, penstock, bids close April 4.

Reinforcing Steel

Awards 1850 Tons—New Projects
5650 Tons

AWARDS

Melrose, Mass., 360 tons, high school, to Joseph T. Ryerson & Son, Inc.
Ossining, N. Y., 200 tons, power house, knit shop and tunnels at Sing Sing Prison, to Igoo Brothers.
Coatesville, Pa., 150 tons, sewage disposal plant, to Kalman Steel Co.
Cincinnati, 230 tons, road work in Hamilton County, to Jones & Laughlin Steel Corp.
Los Angeles County, Cal., 100 tons, San Gabriel dam, to Merritt, Chapman & Scott.
Riverside, Cal., 150 tons, University of California entomology building, to Pacific Coast Steel Co.
Vancouver, B. C., 300 tons, First Narrows water tunnel, to Evans, Coleman & Evans.
Oahu, T. H., 350 tons, wharf and railroad trestle, to Newport Contracting & Engineering Co.

NEW REINFORCING BAR PROJECTS

Boston, 240 tons, two police stations.
State of New Jersey, 4000 tons, steel for decking, Route 25; bids readvertised for March 9.
State of Pennsylvania, 280 tons, four highway bridges; bids Feb. 26.
Marseilles, Ill., tonnage being estimated, dam and lock on Illinois River.
Milwaukee, 300 tons, paving; New York distributor, low bidder.
Milwaukee, 150 tons, Government work; bids opened.
Fairbanks, Alaska, 350 tons, post office, William MacDonald Construction Co., low bidder.
Sunnyvale, Cal., 380 tons, barracks, etc.; Robert E. McKee Co. general contractor.
Alta Loma, Cal., 150 tons, sanitorium.

Railroad Equipment

Belt Railway of Chicago placed order with Pressed Steel Car Co. for repairing 100 hopper cars.

Hauser Construction Co. ordered two air-dump cars from Magor Car Corp.

Wheeling & Lake Erie is inquiring for 50 to 100 70-ton steel gondola cars.

Alton is asking for bids on dismantling or selling 8000 miscellaneous freight cars, 100 passenger cars and a number of locomotives.

Kansas City Southern contemplates building 25 70-ton hopper bottom cars in its own shops.

Santa Fe is considering reconditioning 25 dining cars with air cooling equipment.

Cast Iron Pipe

Albany, N. Y., opened bids Feb. 20 on 600 tons of 36 and 48-in.; Warren Foundry & Pipe Corp. is low bidder.

Brentwood, N. Y., is taking bids until March 2 on 285 tons of 3 to 36-in.

United States Navy has postponed award of 300 tons of 10-in., on which United States Pipe & Foundry Co. is low bidder.

Tulsa, Okla., is inquiring for 30,000 ft. of 6 to 12-in.

Long Beach, Cal., awarded 2750 tons for city water system to United States Pipe & Foundry Co.

Beverly Hills, Cal., will close bids March 1 on 241 tons for city water system.

Cathlamet, Wash., awarded 100 tons for city water system to Pacific States Cast Iron Pipe Co.

Olympia, Wash., will open bids March 11 on 142 tons.

Wenatchee, Wash., awarded 230 tons of 28-in. pipe for city water system to King Brothers Water Co.

Pipe Lines

Soviet Oil Trust, Soviet Russian Government, Moscow, plans construction of steel pipe line for oil service from Guriyev to Orsk, 740 kilometers (about 460 miles), work to begin at each end of line at same time. Cost 80,000,000 rubles (about \$40,000,000) with pressure stations and other facilities. Amtorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

J. W. Frazier, McAllen, Tex., is at head of project to build 8 to 10-in. pipe line from point near Rio Grande City, Tex., to Gulf Coast, for crude oil.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 8 for 7000 ft. welded steel pipe for Philadelphia, 6200 ft. for Hampton Roads, and 3600 ft. for Mare Island Navy Yard. (Schedule 7490).

New Facts Disclosed Regarding Rustless and High-Speed Steels and Inclusions in Castings

(Concluded from page 507)

must be taken into consideration in connection with each commercial application.

R. H. Aborn, of the United States Steel Corp'n. Research Laboratory, testified that the author's ferrite hypothesis has been corroborated in his organization's work but that the ferrite's presence is not always a guarantee against intergranular attack.

How to Heat-Treat "Stainless Iron"

Another paper at the same session was entitled "Effect of Heat Treatment on Corrosion Resistance of Stainless Iron." The author was Clarence G. Merritt, Atha Works, Crucible Steel Co. of America, Harrison, N. J.

Stainless iron is defined by Mr. Merritt as "mild stainless steel, an alloy ranging from 11.50 to 15 per cent chromium with carbon under 0.12 per cent" and "considered to be not appreciably affected in respect to corrosion by heat treatment." He states that this metal has failed in many applications because of insufficient information regarding its heat treatment.

The results of the author's research into this field are partly as follows. He finds that tempering this product at about 1000 deg. F. from the as-quenched or as-rolled condition produces marked susceptibility to corrosion and weakness in impact, accompanied by lower hardness, a weakening in proportional limit and a general breakdown of the metal.

It is also his finding that the tensile properties and corrosion resistance of heat-treated stainless iron are excellent when tempered either above or below the susceptible range. Partly hardened or as-rolled steel is likely to be subject to attack unless tempered at 1100 deg. F. or higher, he states.

Other Steels Act Similarly

That some of the silicon steels are similar to this type of steel, so far as brittleness is concerned, was the testimony of W. F. Ruder, General Electric Co., Schenectady, N. Y. F. N. Speller, National Tube Co., Pittsburgh, called attention to the fact that corrosion of this steel is of a different type from ordinary corrosion and that generalization should be avoided.

The characteristics which the author pointed out as the results of tempering at about 1000 deg. F. should not be looked upon as peculiarities or idiosyncrasies of stainless iron, said Mr. Mathews, but merely as properties which must be borne in mind in the commercial use of this material. Other steels have critical ranges which must

be avoided in their heat treatment. Many of the high-tensile chrome-nickel construction steels must be quickly cooled from the tempering temperature to avoid impact brittleness. And many of the S.A.E. steels have a lower impact resistance after tempering at 600 deg. F. than they have when tempered either lower or higher. When these properties are known and suitable heat treatments are applied, depending on inherent properties, successful use is insured.

Determining Degree of Corrosion

The third paper at this session described "A Quantitative Method for the Estimation of Intercrystalline Corrosion in Austenitic Stainless Steels." It was a contribution from two members of the research laboratory of the United States Steel Corp'n., Kearny, N. J., J. J. B. Rutherford and Robert H. Aborn.

The authors find that the change in electrical resistance which takes place during intergranular corrosion attack can be made the basis of a quantitative method for the estimation of the degree of such attack in austenitic stainless steels. The method has been developed into a significant routine test for measuring the susceptibility to intergranular corrosion in such alloy steels arising from their composition or their previous history.

How Inclusions Affect Steel Castings

A paper which attracted considerable attention was entitled "Inclusions—Their Effect, Solubility and Control in Cast Steel." The authors were C. E. Sims and G. A. Lilliequist, research metallurgists, American Steel Foundries, Chicago. It was one of the papers at the symposium on gases in metals.

The paper is a summation of observations made and conclusions drawn over a period of three or four years rather than a report of experiments made with a definite objective.

The authors find that there is a direct relationship between the character and distribution of inclusions in cast steel and the ductility of such steels; that the globular type of inclusion, scattered haphazardly through the steel, has the minimum effect on the physical properties; that variations in quantity of inclusions ordinarily found in steel have no effect on the physical properties and that the eutectic type which forms a network in the steel causes the steel to rupture after slight plastic flow with resultant low ductility. They also find that the normal inclusion-forming material of steel is soluble in the molten state and precipitates as inclusions at the time of solidification.

If the iron oxide content of the steel is high, say the authors, the inclusions will precipitate at the beginning of solidification and will exist as globules of silicates and sulphides and the steel will have good ductility. But, if the iron oxide content is too low, the solubility of the sulphides is increased to such an extent that they precipitate as a eutectic with the last steel to freeze, and the ductility of such steel will be low.

Comment on the Paper

That the network caused by aluminum is responsible for low ductility in castings has again been effectively shown, said Dr. A. B. Kinzel in a written discussion. The solubility of the aluminum-bearing sulphides and silicates has been demonstrated, together with the effect of mass on the size of the inclusions. It is probable that iron silicates are least soluble and that manganese silicates are slightly more soluble, with a large proportion of the silicates still remaining insoluble in the molten metal.

Very successful steel castings have been produced by the use of zirconium, according to Dr. Kinzel, and it appears that the amount of this metal added is less critical than that of aluminum in readily producing the desired type of inclusions. The low ductility reported from the use of calcium-silicon is not confirmed by experience, as this alloy does not readily modify the sulphides and has been found to be most effective in producing sound castings with good ductility.

Comment by R. A. Bull, director, Electric Steel Founders' Research Group, Chicago, was to the effect that a study of the text and illustrations appears to justify the tentative conclusions reached by the authors. He expressed the hope that the work done will prompt further investigations along the same lines by other companies and that ultimately, "even if we never learn how to eliminate inclusions, we may find out how to regulate their forms and thus make them innocuous." As several researchers have pointed out, inclusions of the kind discussed in the paper are the normal result of the introduction of degasifiers. The authors have materially assisted steel foundrymen to attain their objective.

Charles L. Jarvis Co., Portland, Conn., has acquired the business of Biach Flexible Shaft Co., New York. The Biach plant will be moved to Portland. The Chicago office and stock of the Biach company, formerly located at 430 West Ontario Street; will be moved to the offices of the Federal Machinery Sales Co., 17 South Jefferson Street. The Federal Machinery Sales Co. will continue to represent the Jarvis company and will add the Biach lines.

PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Trade is Still Drifting

Slight Improvement in Some Markets
But No Indication of Real Broadening of Activity

ALTHOUGH machine tool orders and inquiries have shown improvement in some centers, the change for the better is so slight that it can scarcely be said to have significance. Certainly there is no real broadening of interest in equipment purchases among manufacturers

of metal goods, nor is there any hope for an important change until the general business situation has turned markedly for the better.

A great deal of used machinery is being thrown on the market. The attendance at auction sales indicates an interest in picking up bargains. Many

of the sales have been made at extremely low prices. On March 1 and 2 about 375 machines from the Cleveland plants of the Hupp Motor Corp. will be offered for sale. Machine tool equipment in the plant of the Cincinnati Frog & Switch Co., Cincinnati, will be auctioned on Feb. 26.

New York

Inquiries for machine tools in this market have been showing a slight improvement throughout February, but the renewed interest being taken by manufacturers in prospective equipment purchases is, after all, only noteworthy because it shows some improvement over conditions experienced in preceding months. Orders have gained only slightly, and the market situation leaves much to be desired. Machine tool sellers fully realize that there will be no important change until the general business situation has improved measurably.

Chicago

The machine tool market in this district continues to drift, with little demand except for small tools, which appears to be gaining slowly. Studebaker Corp., South Bend, Ind., has ordered several machine tools rebuilt. There is no inquiry from the railroads and the agricultural machinery group is inactive. Attendance at auction sales is large, but bidding is listless and sales are at low figures.

Cleveland

The machine tool market shows little change. Sales the past week were confined to single orders for small machines. Special production machinery for forming operations is moving fairly well. The United States Army Air Corps purchased two 20-in. geared head motor-driven lathes for Wright Field, Dayton, and is inquiring for a 10 x 24-in. geared head lathe for the same field.

Considerable used machinery is on

the market and this will be augmented by about 375 used machines from the Cleveland plants of the Hupp Motor Corp., which will be offered for sale March 1 and 2. The list includes a large amount of gear cutting machinery. There is also an assortment of grinding machines, screw machines, turret lathes, drilling and milling machines and other tools. The Hupp Corp. has moved most of its manufacturing work to Detroit, which is the reason for selling the machinery in Cleveland. Machine tool equipment in the plant of the Cincinnati Frog & Switch Co., Cincinnati, will be offered for sale Feb. 26.

Cincinnati

Although machine tool manufacturers remain optimistic, current business is still spotty. Orders the past week were few and only for single units. Inquiry is fairly steady, although there is little to indicate any buying movement from new requests for quotations.

Pittsburgh

Orders placed thus far in the month show no improvement over those of January, but the volume of active inquiry is somewhat heavier. A better feeling on the part of buyers is also reported, although lack of appropriations is still holding up orders for needed equipment.

Local machinery dealers are watching the railroads for signs of activity, as much equipment is needed in their shops and repair work is expected to be one of the first things on which the carriers will make expenditures. The Pennsylvania has made no statement regarding the replacement of its

Twelfth Street shops in Altoona, which were recently destroyed by fire.

Milwaukee

While some disappointment is expressed over the restricted volume of machine tool business, prospects for improvement are considered favorable. Inquiry has broadened somewhat and is coming from a greater number of industrial lines. It is increasingly evident, however, that actual purchases await definite betterment of production schedules. While several leading passenger car builders have placed fair-sized orders for tool room and production equipment, others are delaying action on inquiry originating as long as three months ago.

◀ NEW YORK ▶

Conran Supply Co., Long Island City, plumbing equipment and supplies, has leased factory at Twenty-seventh Street and Skillman Avenue for new storage and distributing plant, with pipe-cutting and mechanical shop.

Patterson-Sargent Co., 135 East Forty-second Street, New York, manufacturer of paints, varnishes, etc., plans one-story tank house addition, 30 x 65 ft., to plant at Long Island City.

Signal Supply Officer, Army Base, Brooklyn, asks bids until March 8 for 500 aluminum alloy frames and 500 mountings (Circular 94); until March 1 for quantity of solder (Circular 95).

Brooklyn Metal Auto Trunk Co., Brooklyn, has been organized by Samuel Wolf, 193 Floyd Street, and associates, capital \$50,000, to take over and expand company of same name at 338 Berry Street, manufacturer of all-metal trunks and kindred products.

Majestic Metal Specialties, Inc., 342 West Fourteenth Street, New York, manufacturer of metal goods, leased 35,000 sq. ft. space in building at 200 Varick Street for new plant.

Bureau of Supplies and Accounts, Navy Department, Washington, and Naval Supply Depot, Brooklyn, asks bids until March 1 for one cabinet-type sandblast equipment (Schedule 7522), and storage batteries (Schedule 7520); until March 15 for quantity of half-



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masks, respirators (Schedule 7544), all for New York Navy Yard.

Ridge Steel Gypsum Partition Corp., New York, has been organized by William Adams, 369 Lexington Avenue, and Pasquale Grassi, 271 Madison Avenue, to manufacture ridge-steel gypsum partitions and other steel products.

Erie Railroad Co., 50 Church Street, New York, has plans for electrification of part of suburban lines in New Jersey, including main line between Paterson and New York, and will use gas-electric motor cars, trailers and accessory equipment.

New York Central Railroad Co., Grand Central Terminal, recently resumed operations at locomotive shops at West Albany, N. Y., giving employment to 1200 men on day shift and 500 men on night schedule.

Robert O. Beebe, director, Essex County Vocational Schools, Hall of Records, Newark, N. J., asks bids until Feb. 29 for machine and hand tools; equipment and supplies for machine, sheet metal, electrical, auto mechanics, pattern-making, plumbing, carpentry and other departments; cabinets, lockers, etc., for county vocational schools.

Baxter Mfg. Co., Newark, has leased floor in building at 359 Mulberry Street for manufacture of metal specialties, with electroplating department.

Harold E. White, 417 Cleveland Avenue, Plainfield, N. J., manufacturer of automobile tops, frames and equipment, has purchased adjoining property for expansion.

Central Jersey Aero Club, Hightstown, N. J., approved plans for new all-steel hangar with shop facilities at Central Jersey Airport, Hightstown-Windsor Road.

Aeromarine Plane & Motor Co., Keyport, N. J., manufacturer of seaplane and airplane motors and equipment, Inglis M. Uppercu, president, has purchased plant and equipment of affiliated interest, Aeromarine-Klemm Corp., Locust Point, manufacturer of kindred products, at receiver's sale for \$200,000. Purchasing company will occupy plant.

Banfield Sea Skiff Works Corp., Atlantic Highlands, N. J., care of Applegate, Stevens, Foster & Reussille, Red Bank, N. J., representatives, has been organized by Joseph E. and Charles A. Banfield, Locust, N. J., to operate a boat-building and repair works.

Public Service Electric & Gas Co., Terminal Building, Newark, acquired municipal electric light and power plant at Orange, N. J., and agrees to spend \$40,000 at once on extensions and improvements in local system and an additional \$100,000 during the next five years.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 1 for one air dehydration unit for naval air station, Lakehurst, N. J. (Schedule 7554).

◀ SOUTH ATLANTIC ▶

Compap Products Co., 2205 Eutaw Place, Baltimore, recently organized by Millard S. Leonard and associates, has plans for one-story factory for manufacture of line of special paper products. Cost over \$30,000 with equipment.

Department of Commerce, Bureau of Census, Washington, asks bids until Feb. 29 for quantity of steel shelving (Proposal 216).

Cecil County Board of Education, Elkton, Md., contemplates manual training department in two-story high school. Bids asked on general contract. Cost about \$100,000. Clyde N. and Nelson Friz, Lexington Building, Baltimore, architects.

Board on Engineer Equipment, Fort Humphreys, Va., asks bids until Feb. 29 for small castings and patterns (Circular 10).

Telerad Mfg. Co., Baltimore Life Building, Baltimore, has been organized by John L. Strickland and associates to manufacture electrical devices and equipment.

Atmospheric Nitrogen Co., Hopewell, Va., is increasing capacity at synthetic nitrate of soda works, placing a third plant unit in operation. Company has recently secured contract from French government for 25,000 tons of material.

David Lynn, architect of capitol, Capitol Building, Washington, asks bids until March 10 for complete power substation equipment for new House of Representatives office building.

General Purchasing Officer, Panama Canal, Washington, asks bids until March 10 for bolts, nuts, screws, spikes, motor-generator set, car wheels, steel pipe and fittings, corrugated metal roofing, rigid steel conduit air brake hose, transformers, knife switches, wire and

cable, electric motors and other mechanical and electrical equipment (Schedule 2732).

Atlantic Steel Co., Sixteenth Street, Atlanta, Ga., plans one-story addition, 70 x 140 ft. Cost about \$25,000 with equipment.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until March 2 for one complete carbon dioxide gas system, two 35-lb. cylinders (Circular 90).

Turner Flying Service, Inc., care of Robert A. Turner, 30 Stanley Woolsey Street, Asheville, N. C., has acquired airport near Fletcher, N. C., heretofore held by T. J. Roberts, Asheville, and will carry out expansion, including new hangar, machine shop and other field units. Cost about \$50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 1 for one electric box-type furnace and one vertical crucible-type electric furnace (Schedule 7516) for Annapolis Navy Yard; one motor-driven multiple drilling machine (Schedule 7427), quantity of corrosion-resisting seamless steel tubing (Schedule 7517), 150,000 lb. structural and ship channel steel (Schedule 7525) for Norfolk Navy Yard; one motor-driven centrifugal pump (Schedule 7505) for Parris Island, S. C., Navy Yard; until March 15 for quantity of bolts, screw eyes, hasps, staples, etc. (Schedule 7523) for Eastern and Western yards.

◀ NEW ENGLAND ▶

Hardware City Iron Works, New Britain, Conn., recently organized by Fred Welslau, has opened a shop at 205 Elm Street for production of structural and ornamental iron work, including fire escapes, stairs, railings, etc.

Department of Public Works, Shrewsbury, Mass., has plans for one-story equipment storage and distributing plant, with garage and repair facilities. Cost about \$35,000 with equipment. A. J. Daniels, 661 Main Street, engineer.

Perfection Marker Co., Cambridge, Mass., has been organized by Lloyd H. McLaughlin, 153 Milk Street, and associates, to manufacture marking machines, numbering devices, etc. William H. Brennan is president.

School Board, Greenwich, Conn., contemplates manual training department in new two-story and basement school on Hendrie Avenue. Cost about \$250,000. Bids to be asked on general contract early in March. W. F. Dominick, 19 West Forty-fourth Street, New York, architect.

Board of Works, Pittsfield, Mass., plans installation of electric-operated pumping plant, filtering equipment, pipe lines, etc., in proposed sewage disposal plant and system. Cost over \$450,000. Metcalf & Eddy, Statler Building, Boston, consulting engineers.

Newport Shipyard, Inc., Newport, R. I., has been organized by Reginald V. Pierson, 38 Morton Avenue, and associates, capital \$50,000, to operate shipbuilding and repair works. Frederick D. J. Pierson, Newport, is interested in company.

General Electric Co., Schenectady, N. Y., asked bids on general contract through General Electric Realty Corp., a subsidiary, for two-story factory branch, storage and distributing plant, 100 x 125 ft., with service department, at Springfield, Mass. Cost over \$150,000 with equipment.

John Swanson Granite Co., Concord, N. H., contemplates building a crane runway and making other improvements.

Essex Packing Co., Beacon Street, Lawrence, Mass., requires tram rails and other handling equipment for its plant addition.

◀ CINCINNATI ▶

Board of Education, Hamilton, Ohio, plans manual training department in three-story and basement high school, for which plans are being revised. New bids to be asked soon on general contract. Cost \$400,000. Fred G. Mueller, Rentschler Building, and George W. Barkman, Third and High Streets, associate architects.

Queen City Aluminum Foundry Co., Cincinnati, has been organized by Roy and Bernard J. Warman to take over and expand company of same name, with foundry at 2010 Elm Street.

Contracting Officer, Wright Field, Dayton, Ohio, asks bids until March 2 for 19 four-wheel plain trolleys, 4-ton capacity, and for similar unit, ½-ton capacity (Circular 294), for battery rectifiers (Circular 291), until March 7 for two battery charging outfits (Schedule 293), propeller hubs (Circular 297), landing lamp assemblies (Schedule 298); un-

til March 8 for three air compressors, complete with air receiver, motor and after cooler (Circular 295).

Athens Stove Works, Athens, Tenn., let general contract to Nicholson Construction Co., 102 West Clinch Avenue, Knoxville, Tenn., for one-story addition, 125 x 200 ft. Cost over \$50,000 with equipment.

Board of Education, Hume Fogg Building, Nashville, Tenn., plans manual training department in three-story and basement high school to cost \$360,000. General contract let to L. V. Nicholson Co., Independent Life Building, Marr & Hohman, Stahlman Building, architect.

Val Decker Packing Co., Piqua, Ohio, meat packer, has plans for addition to plant, including improvements in present unit. Cost over \$30,000 with equipment. Anders & Reimers, Schofield Building, Cleveland, architects.

Dallman Metal Products Co., Cincinnati, care of C. F. Rust, 612 Traction Building, representative, has been organized by William and Ray Dallman, Cincinnati, to manufacture metal products.

City Council, Versailles, Ky., will receive bids about April 1 for electric-operated centrifugal pumping equipment and auxiliary machinery, about six miles cast iron pipe and other equipment for municipal waterworks. H. K. Bell, city engineer.

◀ DETROIT ▶

Ford Motor Co., Dearborn, Mich., is carrying out improvements and expansion at assembling plant at Denver, in connection with production of new models. Equipment costing close to \$1,000,000 is being installed. Plant is now giving employment to about 675 men and this number will be increased by over 100 men early in March. Plant will run on day and night production schedule.

Kay & Jay Mfg. Co., 6420 Epworth Boulevard, Detroit, arranged for change of name to Davis Stamping Co., specializing in production of metal stampings.

Board of Commerce, Mount Clemens, Mich., has concluded negotiations with an industrial company, name temporarily withheld, to take over and operate a plant at formal local factory of Copeland Co., Cass Avenue and Grand Trunk Railway.

C. & W. Wire Container Co., Detroit, has been organized by J. W. Cook, 906 Detroit Savings Bank Building, M. H. Wyckoff, Jr., and associates to manufacture wire products.

Monitor Sugar Co., Bay City, Mich., recently organized, has leased local mill of Columbia Sugar Co. and will carry out improvement and reconditioning program in plant and machinery.

Steel Furniture Co., Grand Rapids, Mich., has been organized as interest of Irwin Seating Co., 1480 Buchanan Avenue, S. W., to manufacture steel furniture.

◀ PITTSBURGH ▶

Department of Property and Supplies, Bureau of Engineering and Construction, Capitol Building, Harrisburg, Pa., asks bids until March 2 for construction of tractor, truck and storage buildings at Logan Armory, Pittsburgh. John L. Hanna, secretary.

United States Engineer Office, Pittsburgh, asks bids until March 15 for construction of one steel hull dipper dredge, capacity 2½ yd., 100 ft. long, 34 ft. wide, and 8 ft. deep.

Venango Mfg. Co., Franklin, Pa., manufacturer of automobile equipment, parts, etc., subsidiary of Franklin Railway Supply Co. First and Liberty Streets, asks bids on general contract for one-story plant, 260 x 300 ft. Cost over \$150,000 with equipment.

Adcraft Neon Corp., 117 North Highland Avenue, Pittsburgh, manufacturer of electric signs and displays, is considering establishment of plant at Fairmont, W. Va. Chamber of Commerce, Fairmont, is interested in project.

United States Engineer Office, Huntington, W. Va., asks bids until March 1 for 30 cylindrical steel floats (Circular 156); until March 17 for construction of one steel hull, 15-ton whirler derrick boat for United States Repair Station, Marietta, Ohio.

Shenango Furnace Co., Sharpsville, Pa., is resuming operations in foundry department after curtailment of several weeks.

Alexander Reid, 331 Beaver Road, Leetsdale, Pa., contemplates erection of one-story foundry.

Mesta



MODERN BLOOMING MILLS

FULL OPERATING VISION
ACCURATE CONTROL
HIGH TONNAGE
LOW MAINTENANCE

MESTA MACHINE COMPANY
Pittsburgh, Penna., U.S.A.

◀ PHILADELPHIA ▶

Thomson Wood Finishing Co., 835 North Third Street, Philadelphia, manufacturer of varnishes, paints, etc., leased building at Pottstown, Pa., for factory branch, storage and distributing plant.

Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until Feb. 29 for quantity of cast iron boxes, hangers, reflectors, receptacles, etc. (NSAF Req. 5132); also lubricating system elbow fittings, brass straight fittings (Aero Req. 1135).

Ero Mfg. Co., Mascher and Berks Streets, Philadelphia, manufacturer of automobile equipment, with main works at 714 West Monroe Street, Chicago, has leased entire floor in factory at Mutter and Berks Streets for local plant.

Barthol, Inc., Merion, Pa., was recently organized by Joseph F. and G. W. McElwee, 236 Valley Road, and associates, to manufacture scientific equipment, laboratory apparatus, etc.

Neptune Rubber Mfg. Co., 769 Stuyvesant Avenue, Irvington, N. J., manufacturer of molded rubber products, has leased factory at Trenton, N. J., for new plant and will remove to new location.

New York Shipbuilding Co., Camden, N. J., secured contract for improving and reconditioning four ships for American Scantic Line, 5 Broadway, New York, each to cost close to \$175,000 and will advance plant operations.

Bureau of Supplies and Accounts, Navy Department, Washington, and Navy Yard, Philadelphia, asks bids until March 1 for two 7-ton capacity semi-trailers and two fifth wheels (Schedule 7507); until March 8 for motor-generator sets, panels and spare parts (Schedule 7503) for Philadelphia Navy Yard.

Swift & Co., Union Stock Yards, Chicago, have awarded general contract to William Steele & Sons Co., 124 North Fifteenth Street, Philadelphia, for two-story and basement branch packing, storage and distributing plant, 85 x 100 ft., at Wilkes-Barre, Pa. Cost about \$40,000 with equipment. Philadelphia offices at Ninth Street and Girard Avenue.

◀ BUFFALO ▶

F. N. Burt & Co., Ltd., 514 Seneca Street, Buffalo, manufacturer of corrugated and other paper boxes and containers, has acquired for expansion plant and business of Hefter & Co., Inc., 1 Junius Street, Brooklyn, N. Y., manufacturer of kindred products, in receivership for several months, for \$62,000.

Morrison Railway Supply Co., 1449 Bailey Street, Buffalo, has filed plans for a one-story welding shop.

Gildersleeve Machine Co., Buffalo, has been organized by Harold Brock, 598 Spring Street, and Thomas F. Myers, 720 West Delavan Avenue, to manufacture machinery and parts, including electrical equipment.

Syracuse Washing Machine Corp., Solar and Spencer Streets, Syracuse, N. Y., has adopted full time, five-day week schedule, with about 1000 operatives.

Lake Ontario Power Co., Sodus, N. Y., plans extensions and improvements in electric power and transmission lines.

Consolidated Aircraft Corp., 2050 Elmwood Avenue, Buffalo, is working on Government order for 24 giant flying patrol boats, contract totaling about \$2,000,000.

Precision Castings Co., Fayetteville, Syracuse, N. Y., has increased production schedule to more than 80 per cent of capacity, with employment of night shift in machine shop.

◀ INDIANA ▶

City Council, Michigan City, let general contract to Tonn & Blank, 104 North Franklin Street, for municipal equipment storage, service and distributing plant, 62 x 112 ft. Samuel Boonstra, Warren Building, architect.

Board of Public Works, Anderson, contemplates installation of additional equipment in municipal electric light and power plant.

Millwright & Welding Service, Inc., South Bend, has been organized by Ralph Z. Zellers and Joseph Sullivan, South Bend, to operate welding, forge and sheet metal works.

Public Service Co. of Indiana, Indianapolis, has arranged for merger with Indiana Electric Corp., operating at Plainfield, Danville and vicinity, under first-noted name. Consolidated organization will serve total of 275 communities in central and southern part of State,

and plans expansion and improvements, including transmission lines.

Rutenber Electric Co., Marion, manufacturer of electric ranges, parts, etc., will advance production schedule, increasing working force about 40 per cent. Company has secured order for 500 ranges from American Gas & Electric Co., New York.

State Highway Department, Indianapolis, let general contract to Charles Cooper, Odon, for one-story equipment storage, service and garage building, 50 x 120 ft., at Vincennes. Vonnegut, Bohn & Mueller, Indiana Trust Building, Indianapolis, architects.

◀ CHICAGO ▶

Armour & Co., Union Stock Yards, Chicago, contemplates extensions and improvements in packing plant at South Omaha, Neb. Cost about \$200,000 with equipment.

City Council, Waterloo, Ill., plans installation of pumping machinery and auxiliary equipment for sewage disposal plant and system. Cost about \$100,000. Sheppard, Morgan & Schwaab, Faulstich Building, Alton, Ill., engineers.

Public Service Co. of Northern Illinois, Waukegan, plans rebuilding part of power plant recently destroyed by fire. Loss about \$200,000 with equipment.

Bureau of Reclamation, Denver, asks bids until March 10 for one-story 20-car service and garage building, and two 12-car service and garage units at Boulder City, Nev., Boulder Canyon project (Specification 557-D).

Board of Education, Glencoe, Minn., contemplates manual training department in three-story and basement junior and senior high school on site just selected. Cost about \$225,000. George Pass & Son and P. T. Rockey, Eckle Building, Mankato, Minn., architects; Rose & Harris, 430 Oak Grove Street, Minneapolis, mechanical engineers.

American Hydraulic Transmission Co., Berwyn, Ill., has been organized by Theodore E. Brown, Berwyn, and associates, capital \$90,000, to manufacture transmission equipment.

Department of Water, Lake Forest, Ill., plans installation of pumping equipment and other machinery at municipal waterworks. Cost about \$30,000.

City Council, Grand Junction, Iowa, O. V. Blaylock, clerk, asks bids until March 8 for municipal electric light and power plant, including two Diesel engine units, electric generators and accessory equipment. Cost about \$85,000.

Eagle Steel Wool Co., 3500 South Morgan Street, Chicago, and affiliated interests, will occupy one-story plant at 6201-27 West Sixty-fifth Street, recently completed by Clearing Industrial District, totaling 50,000 sq. ft., for manufacturing, storage and distributing service.

◀ MILWAUKEE ▶

Lamp-Time Corp., Milwaukee, has been organized to manufacture line of combination table lamps and electric clocks. Shop space has been leased at 2618 North Fourth Street, and offices opened at 176 West Wisconsin Avenue. Jesse C. Bradley, Jr., is president; Arthur H. Bower, vice-president, and Edward V. Ranft, secretary-treasurer.

American Cooling & Refrigerating Systems, Inc., has been organized at Wisconsin Rapids, Wis., to take over plant and production of former National Carbonic Machinery Co. and resume output of large refrigerating units. Principals in new company are R. B. Graves, T. W. Brazeau and Robert Goggins, all of Wisconsin Rapids.

Standard Oil Co. (Indiana), 414 West Michigan Street, Milwaukee, has announced intention of abandoning construction of new \$300,000 bulk storage plant on city of Milwaukee's outer harbor development, due to action of railroads in reducing tariff on tank car shipments from Chicago district refineries.

Louis Allis Co., 427 East Stewart Street, Milwaukee, manufacturer of electric motors, has received order for electrical air-conditioning equipment for 30 sleeping cars from large railway system, identity of which is not disclosed. Order includes fan motors and standby motors for driving compressors when cars are not in motion. January orders are reported 20 per cent ahead of average for last four months.

City of Marinette, Wis., has authorized bond issue of \$65,000 for construction and equipment of municipal sewage disposal plant. A. L. Hillis is city clerk.

◀ CLEVELAND ▶

Nopiming Oil Co., 528 Security Building, Minneapolis, has plans for bulk gasoline and oil storage plants at Wausau, Bellwood and Rhinelander, Wis., and Ironwood, Mich. Prospective investment exceeds \$85,000. E. D. Sterling is secretary.

Akron Steam Heating Co., Akron, Ohio, subsidiary of Ohio Edison Co., same address, plans expansion and improvements, including new operating stations at Medina and Fairlawn, cost about \$65,000; extensions in steam lines at Akron and vicinity, cost \$50,000. Parent company will also carry out expansion at different points, including transmission and distributing lines, \$425,000; meters and accessories, \$85,000, and underground lines at Akron, \$55,000.

Goodyear-Zeppelin Corp., Akron, Ohio, has plans for hangar, 75 x 180 ft., 70 ft. high, at Pal-Waukee airport, Chicago, with repair and reconditioning shop. Cost over \$90,000 with equipment. Ladue & Smith, Akron, architects.

Board of Education, Whitehouse, Ohio, plans manual training department in two-story school. Bids asked on general contract until Feb. 29. Cost about \$100,000. Howard Mainor, Grand Rapids, Mich., architect.

Pharis Tire & Rubber Co., Newark, Ohio, will increase production schedule to 24-hr. day basis, following curtailment for several months. About 750 men will be reinstated.

Wireless Neon Corp., Cleveland, care of Morton S. Zaller, 837 Leader Building, representative, has been organized by Seth Cummings, Walter L. Benjamin and associates, to manufacture electric signs and displays.

Electric Auto-Lite Co., Champlain and Mulberry Streets, Toledo, manufacturer of automobile starting and lighting equipment, generators, etc., plans increased operation and will recall over 750 workers.

Reeves Mfg. Co., Dover, Ohio, has resumed production following curtailment for several weeks, and will operate on 75 per cent capacity basis.

◀ GULF STATES ▶

United States Engineer Office, Mobile, Ala., asks bids until Feb. 29 for three marine steam boilers (Circular 299).

Gulf Production Co., Frick Annex, Pittsburgh, affiliated with Gulf Oil Co., same address, plans construction of six unit compressor-type gasoline refining plant near London, Rusk County, Tex., capacity for handling 5,000,000 cu. ft. of gas daily. Cost over \$175,000 with equipment.

Lone Star Cement Co., Dallas, Tex., is carrying out expansion and improvements at mill at Cement City, West Dallas, to provide output of quick-hardening cement on 24-hr. continuous basis. Company plans production of about 300,000 bbl. this year.

Superintendent of Lighthouses, Key West, Fla., asks bids until March 7 for metal work for one iron tower.

Paul Millard, city manager, Beaumont, Tex., asked bids on general contract for hangar with repair facilities at municipal airport, in conjunction with administration unit. Cost over \$40,000 with equipment. Irby & Woodside, Goodhue Building, architects.

Constructing Quartermaster, Fort Sam Houston, Tex., asks bids until March 3 for construction of underground electric distributing system.

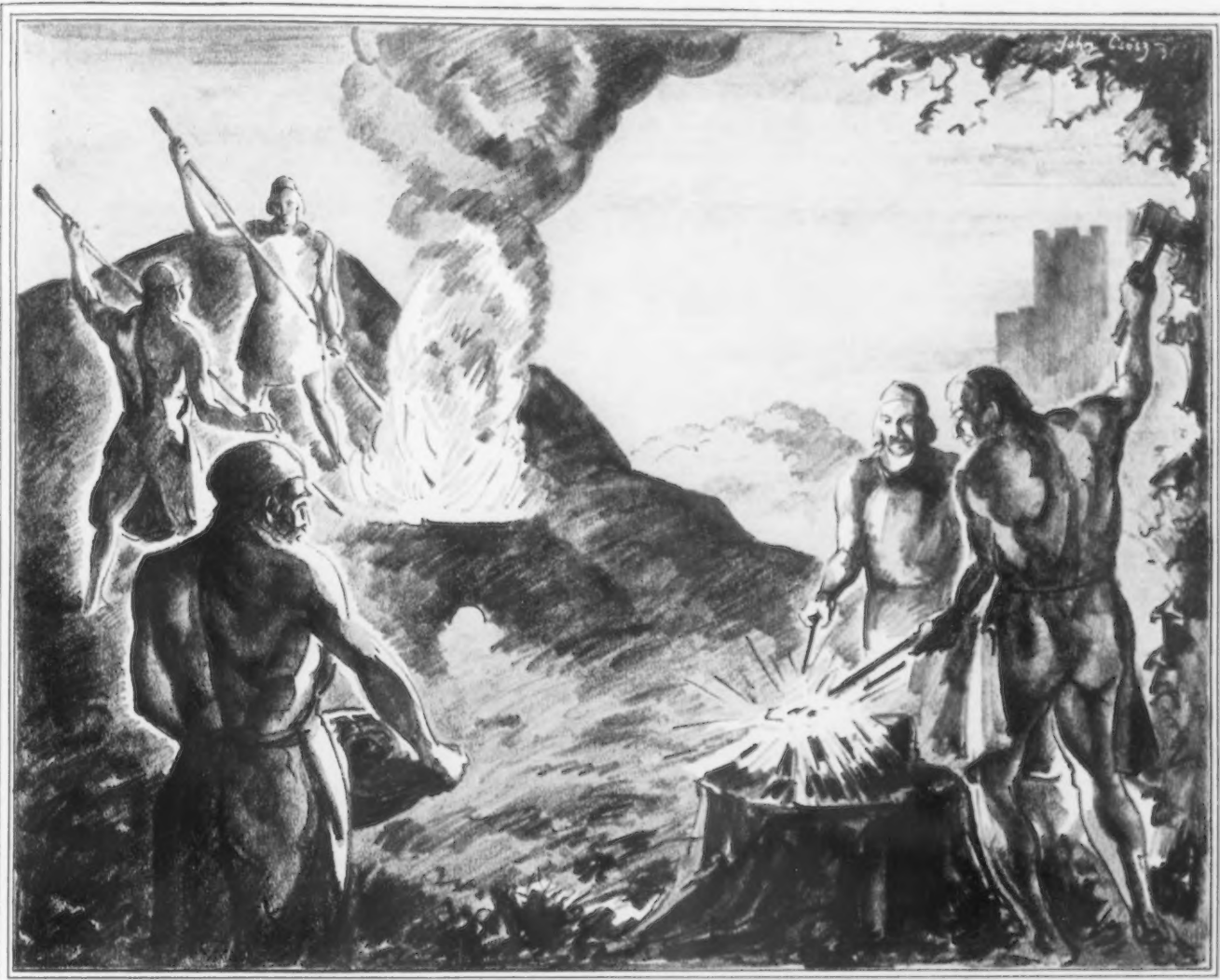
Cord-Tex Co., Inc., New Orleans, has leased portion of factory at 1101 South Peters Street for manufacture of hard fiber cordage products.

Southern Pacific Lines, Houston, Tex., R. W. Barnes, chief engineer, will ask bids in about 60 days for produce terminal at New Orleans, with cold storage and refrigerating plant, conveying, loading and other equipment, car-icing facilities, etc. Cost close to \$1,000,000 with equipment.

Glenn A. Griffin, Kilgore, Tex., and associates have plans for new gasoline refining plant to have capacity of 15,000 gal. a day. Portion of machinery at plant of H. H. Adams, Santa Anna, Tex., will be transferred to Kilgore refinery and additional equipment secured. Kilgore Chamber of Commerce is interested in project.

Marquette Cement Mfg. Co., 140 South Dearborn Street, Chicago, contemplates storage and distributing plant at Vicksburg, Miss., in connection with proposed barge line operation from Memphis, Tenn., to that place.

THE HILLSIDE BLOOMARY



FOR many centuries after prehistoric man had discovered iron the various races groped for better ways to make it. Rude forges were developed in which ore and fuel alternated and the resulting lump of metal was reheated and hammered to give it form and strength. Forced draught for greater heat was introduced, sometimes by use of air bags made from skins and sometimes nature's air currents served. In Belgium, in the tenth century, iron workers dug a hole toward the top of a hill to serve as furnace,

a stone lined channel opening toward the prevailing winds admitting air at the bottom of the hole. Whether produced in primitive furnace or hillside bloomary, iron was hard to make and so valuable that it was counted among the treasures. Some ores made steel of such quality that ancient Damascus and Toledo are famed in history for the excellence of their blades. The iron worker of all ages was a man of consequence and civilizations advanced or receded in proportion to their intelligent use of iron.

[Interlake Iron Corporation, with six blast furnaces, has a yearly capacity of 1,200,000 gross tons of pig iron, serving the malleable and gray iron foundries and steel plants of the nation's largest market. Financial responsibility, technical skill and control of natural resources make this service possible.]

INTERLAKE IRON CORPORATION

PIG IRON / COKE

PICKANDS, MATHER & COMPANY, Sales Agents
CLEVELAND / CHICAGO / DETROIT / ERIE

Cost about \$90,000 with mechanical-handling, loading and other equipment.

Quartermaster Department, Maxwell Field, Ala., asks bids until Feb. 29 for scrapers, graders and kindred machinery (Circular 25).

◀ ST. LOUIS ▶

City Council, St. Charles, Mo., has surveys under way for municipal electric light and power plant. Cost over \$85,000 with equipment. Russell & Axon, 6200 Easton Avenue, St. Louis, engineers.

Economy Products Co., 705 Euclid Avenue, St. Louis, has been organized by W. W. Strickler and associates to manufacture metal sheeting, metal dikes and other metal housings.

City Council, Norfolk, Neb., is considering construction of municipal electric light and power plant.

Laclede Gas Light Co., 1017 Olive Street, St. Louis, is arranging to take over Missouri Industrial Gas Co., operating natural gas properties, and will develop for distribution of natural gas in conjunction with artificial gas from present plants, including mixing stations, pipe lines, etc. Both companies are controlled by Utilities Power & Light Corp., 327 South La Salle Street, Chicago.

Magic City Steel & Metal Corp., Tulsa, Okla., has been organized by Charles Kaufman, 2011 West Brady Street, and associates to manufacture metal products.

Goebel-Reid Grocer Co., 101 North Second Street, St. Louis, contemplates new food canning plants at Searcy, Beebe and DeQueen, Ark., each one and two-story. Cost over \$85,000.

City Council, Oswego, Kan., plans municipal gas plant and distributing system. Cost over \$45,000 with equipment. Emporia Engineering Co., Emporia, Kan., is engineer.

Forrest City Cotton Oil Co., Forrest City, Ark., let general contract to J. A. Moore, Forrest City, for three one-story plant units, 90 x 200 ft., and two structures, each 20 x 100 ft., to replace buildings recently damaged by fire. Cost about \$65,000 with equipment.

Producers Cold Storage Co., Shelby, Mo., has plans for electric-operated cold storage and refrigerating plant, to be operated as unit of local plant of Missouri Farmers' Association. Cost over \$80,000 with machinery.

◀ PACIFIC COAST ▶

Wood Hydraulic Hoist & Body Co., 1210 Mateo Street, Los Angeles, manufacturer of motor truck bodies, hoists, etc., let contract to Marshall P. Wilkinson, Hollywood Security Building, for one-story plant, 200 x 230 ft. Cost over \$75,000 with equipment. Contractor is engineer for work.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until March 2 for pumping machinery for naval air station, Sunnyvale, Cal. (Specification 6789).

Ahe Oro Grande Consolidated Mines Co., Wickenburg, Ariz., G. B. Upton, manager, plans ore mill at copper-mining properties, capacity for handling 1000 tons daily. Cost over \$350,000 with machinery. Will also develop mines and install machinery.

Walter M. Brown, Visalia, Cal., is at head of project to build fruit packing plant and icing station at Earlimart, Cal., to be used by Mission Products Co. Cost about \$40,000 with machinery.

Rainier Products Co., 1550 Bryant Street, San Francisco (formerly Rainier Brewing Co.), plans extensions and improvements in Georgetown Brewery, Seattle, remodeling for beverage manufacture. Cost about \$150,000 with equipment.

Champion Battery Co., Ltd., Los Angeles, care of Wallace W. Toelle, 810 South Spring Street, representative, has been organized by W. C. Armstrong and D. W. Rundel, Los Angeles, to manufacture electric storage batteries and equipment.

El Dorado Oil Works, Third and University Avenues, Oakland, Cal., will ask bids on general contract in about 60 days for one-story bulk oil storage and distributing plant, 40 x 415 ft., and one-story refining works, 100 x 650 ft., for production of special oils. Cost over \$200,000 with machinery. Ellison & Russell, Pacific Building, San Francisco, architects and engineers.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March

8 for 50,000 lb. sheet lead (Schedule 7511); until March 15 for one motor-driven floor type drilling machine (Schedule 7535), one valve refacing machine (Schedule 7531), one motor-driven universal cutter and tool grinder (Schedule 7533), one motor-driven metal-cutting bandsaw machine (Schedule 7536) one electrical test bench (Schedule 7532), 84 crucibles (Schedule 7538) for Mare Island Navy Yard.

Common Council, Sugar Creek, Idaho, plans purchase of turbine pumping units and auxiliary equipment for municipal water service. John J. Ladle, engineer, municipal waterworks, in charge.

White Pass & Yukon Railway Co., Ketchikan, Alaska, plans rebuilding of locomotive and car shops at Skagway, Alaska, recently destroyed by fire. Loss over \$200,000 with equipment.

◀ CANADA ▶

McQuay-Norris Mfg. Co., 37 Pearl Street, Toronto, has acquired site at York Township, Ont., and is having plans prepared by Baldwin & Green, 26 Bloor Street West, Toronto, for a manufacturing plant. First unit will be one story and cost \$45,000. N. A. Hardie is manager.

Dominion Steel & Coal Co., Glace Bay, N. S., recently suffered a fire loss of \$25,000 to its transformer building. Repairs will be made immediately.

Nash Engineering Works, Ltd., Prince George, B. C., has started work on the erection of a one story, 25 x 50 ft., iron foundry on Atlin Avenue.

Municipal Council, Grand Forks, B. C., has plans by A. N. Dockstader, engineer, for improvements to power plant on the Kootenay River, to cost \$40,000. New twin power units developing 460 hp. will be installed. J. A. Hutton is clerk.

◀ FOREIGN ▶

W. D. Flett, city electrical engineer, Nelson, B. C., has recommended construction of a new transmission line from power plant at Bonnington to city; also purchase of a new battery of transformers.

Denes & Friedman, Ltd., Vienna, Austria, manufacturer of automotive parts and equipment, with plants in Austria, France and Germany, has concluded arrangements with Midland Steel Products Co., Cleveland, for manufacture and sale of Midland four-wheel hydraulic brakes, and will provide plant facilities for new line of production.

Soviet Commissariat for Agriculture, Soviet Russian Government, Moscow, plans construction of four electrical machine plants for furnishing equipment to collective farms, two plants to be located in Ukraine, one near Pokrovsk and one in North Caucasus district. Units will be equipped for parts production and assembling, repairs, etc. Work has been authorized on new peat-coking plant in Khilini district, Kola Peninsula, to cost over \$250,000 with equipment. Amtorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

Atlas Artificial Silk Processes, Ltd., Littleborough, England, manufacturer of viscose products, is arranging for reorganization with additional capital of £100,000 (about \$345,000), portion of fund to be used for improvements to provide resumption of production at mill, inactive since 1930.

Simms Motor Units, Ltd., London, England, manufacturer of automotive equipment, organized subsidiary under name of Simms Motor Units of Canada, Ltd., to manufacture electric storage batteries. Company will take over and expand plant on Dundas Street West, Toronto, with facilities for export output.

Stabilized Rail Price Again Discussed in Washington

(Concluded from page 511)

their large dividends. He also declared that "in fairness to the steel roads which paid those excessive dividends, that the information indicates those roads are very much undercapitalized in comparison with the value of their property."

Says Industries Should Not Control Railroads

The commissioner's suggestion that industries should not control railroads or that railroads should not control industries apparently is due to the belief that industrial carriers are given unduly large divisions of rate revenues and also because of the effect of such interlocking interest has on competition.

"I think what our estimates show with respect to the roads controlled by the United States Steel Corp., as well as roads controlled by other industries, tends to support the point which the commission has endeavored to make for a good many years, and that is that there is a tendency, due to the strong competition of the trunk lines, to give unduly generous divisions to industrial railroads, where the industry controls a large amount of traffic. The facts also suggest that there may be something in the claim, which I believe the competitors of the United States Steel Corp. have made, that the company is quite willing that the rates should be fairly high on the ore which the lines which it controls carry, because its com-

petitors have to pay on that ore very often and, of course, they suffer the disadvantage of the charges, if they are too high, whereas the Steel Corporation recoups, through the returns on the railroads, since it controls those railroads absolutely."

Commissioner Eastman explained, however, that in the case of the divisions received by the short line railroads controlled by the Steel Corporation, counsel for the commission had stated that these divisions have been computed strictly in accordance with the formula of the commission in the Chicago & West Pullman case, and in many cases have been fixed specifically by the commission itself.

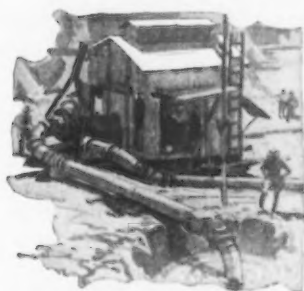
Shelving furniture orders last year were valued at \$4,446,584, compared with \$8,064,853 in the preceding year, according to reports received by the Bureau of the Census from 16 manufacturers. Orders booked last December rose to \$295,262 from \$267,062 in the preceding month.

The American Management Association has arranged a series of conferences devoted to packaging and shipping, consumer marketing and job order production, to be held at the Palmer House, Chicago, March 7-12. In addition, a packaging exposition, with more than 75 exhibitors, will be held throughout the week.

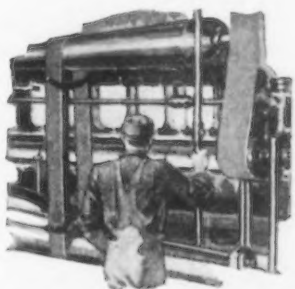
WHICH OF THESE CAN SAVE MONEY FOR YOU?



Goodyear Conveyor Belt at the Claremont plant of the Union Rock Co., Los Angeles, California



Goodyear Suction Hose at work for the American Cyanamid Co., Brewster, Florida



Goodyear Cone Belts—made of cord—as specified by the G. T. M. for a New England textile mill

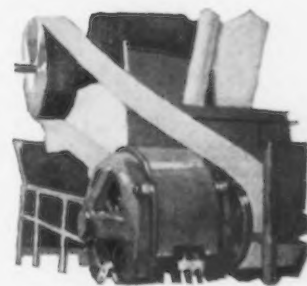
THE sketches shown on this page represent typical installations in which Goodyear Mechanical Rubber Goods are performing better service and saving money.

In your plant operations there may be one or more places where processes could be improved, or trouble and time saved, or replacement costs cut by the use of Goodyear Transmission and Conveyor Belting, Molded Goods, Hose and Packing.

Why not talk over this possibility with the G. T. M.—Goodyear Technical Man? He has seen it come true in a thousand plants, in a score of industries.

The G. T. M.'s service of scientific analysis and expert recommendation is available to you. Or you may obtain specific information about any Goodyear Mechanical Rubber Goods direct by writing to Goodyear, Akron, Ohio, or Los Angeles, California.

TUNE IN: Goodyear invites you to hear John Philip Sousa and his Band... Arthur Pryor and his Band... Revellers Quartet and Goodyear Concert-Dance Orchestra... every Wednesday and Saturday night, over N. B. C. Red Network, WEA and Associated Stations



Goodyear Thor Seamless Belt on a heavy machine drive



Goodyear Air Hose operating drills on a construction job in Texas



Goodyear Elevator Belting as applied by the G. T. M. to work in a Minnesota grain elevator

THE GREATEST NAME

IN RUBBER

GOODYEAR

BELTS • MOLDED GOODS • HOSE • PACKING

Short Selling of Securities—A Menace to Legitimate Business

(Concluded from page 509).

unwise speculation, and then proceeds with all his might to destroy values in order that he may profit.

Short selling, either of stocks, or sometimes of commodities, is harmful to business and industry, and should be prevented as far as possible, without interfering with legitimate business. Every period of depression is prolonged by the efforts of bear traders in stocks or commodities, who do their best to delay a return to normal prices in order that they may accumulate the stocks or commodities which they are obliged to deliver. In an effort to minimize the evil effects of short selling, the New York Stock Exchange authorities have recently required that short sales must be made at a price not lower than the last "regular" sale.

They may thereby diminish the amount of short selling, but the effect of the short selling that goes on is not changed in the least. The gambler is still interested in seeing prices fall and business go to smash. He is still busy circulating pessimistic reports regarding the stock which he has sold short. He is still interested in tearing down the particular business whose stock he has sold, by doing anything he can to hamper its credit and cripple its operations. The short seller is always a destructive factor in our economic life. Ethically he is on a par with the man who sets fire to a house in order that he may pick the pockets of the crowd during the ensuing excitement.

There is a growing tendency in business and industry to establish reserves during periods of prosperity in order that during periods of adversity funds may be available for replacement of machinery and equipment, and for the payment of dividends. Such reserves are very often in the form of stocks in affiliated companies. In order that this plan shall work successfully, it is desirable that stock prices shall be fairly stable, and as free as possible from the manipulations of stock gamblers. The short seller, by depressing the price of such stocks, causes great losses to companies having such reserves, and often makes it impossible to carry out the work for which the reserves were established.

Ways of Checking Stock Gambling

The true interests of finance, business and industry can best be served by eliminating stock gambling and short selling. In 1929 the Federal Reserve Board attempted to check "speculation" (i.e. gambling) by unduly raising the rediscount rate. The effect on "speculation" was nil, since a man who hopes to make 100 per

cent a year does not mind paying 7 per cent or 8 per cent a year for money to gamble with. The actual effect was to start commodity prices on the downward path, after a fairly long period of stability, with the deplorable results which we all know.

Stock gambling can be largely eliminated by a sales tax. To be both just and effective the tax should be graduated, say 2 per cent on stock held less than three months, 1½ per cent on stock held from three to six months, 1 per cent on stock held six months to a year, and ½ per cent on stock held a longer time. Gamblers who turn their stock over once a month would pay a tax of 24 per cent a year. Investors and legitimate speculators who turn their stock over once in three years, would pay 1/144 as much, or 1/6 per cent per year. Even a straight 1 per cent sales tax would make the above investors' tax only 1/36 of the gamblers'.

Another method of suppressing stock gambling is to limit the maximum amount which a bank can loan on a stock to from 60 per cent to 80 per cent of its proved value, which would tend to prevent price inflation. The proved value of a stock is about 12 times its average annual earnings. Probable future earnings are purely speculative, and purely speculative values cannot properly be accepted as bank collateral. Many banks have found themselves in serious trouble by accepting such collateral.

A third method of suppressing stock gambling is to prohibit short sales. Short sales of commodities may or may not be legitimate. It is eminently proper for a manufacturer to sell his product or a farmer his crop, for future delivery. Such a short sale does not tempt the seller to harm his own business, or that of his neighbor, or to strive to cause a fall in prices. A short stock sale is in a different category. The evil may be attacked in a number of ways, such as forbidding banks and brokers to loan stock belonging to customers, levying a stiff tax on such loans, or making such sales a misdemeanor.

Opposition of Brokers to Be Expected

The purpose of these suggestions is, of course, to minimize price fluctuations in securities and to prevent anyone from making a profit by a fall in price of securities. Their adoption will greatly curtail stock market activity. However, no legitimate interest will be harmed, and there will be a distinct economic advantage in the resulting stability, and in turning attention from "speculation" (or as I have more properly termed it, gam-

bling), to production as the true source of wealth.

Such changes as I have suggested will be violently opposed by stock-brokers and bankers whose profits depend on an "active" market (i.e. a large volume of stock sales, usually coupled with abnormal price variations), and on "call" loans which finance the large volume of sales for gambling purposes. Stock brokers perform a beneficial economic function, but when their business expands beyond the legitimate needs of investment and speculation it should be curtailed as a matter of public policy. Call money would be much better employed if it were in the form of commercial loans, or invested in stable securities, instead of being used in the promotion of stock gambling, but the bankers' profits would be lower.

Electric Hoist Orders Down in January

The members of the Electric Hoist Manufacturers Association report that the number of hoists ordered during the month of January, 1932, decreased 39.55 per cent, compared with the previous month, and the value of such orders decreased 43.16 per cent as compared with December, 1931.

Shipments were 23.64 per cent smaller in January, 1932, than they were in December, 1931.

Fluorspar Rates Suspended

WASHINGTON, Feb. 19.—The Interstate Commerce Commission has suspended until Sept. 15 schedules proposing to revise the rates on ex-river fluorspar in carloads between points in Central Freight Association territory. The tariffs would result in both increases and reductions. Illustrative of the schedules are the following rates per net ton:

From	To	Pro-	Pres-
		posed	ent
Freedom, Pa.	Youngstown, Ohio	\$1.80	\$1.20
Martins Ferry, Ohio	Canton, Ohio	2.20	1.50
Mingo Junction, Ohio	Cleveland	2.60	1.90

New Distributer

The Brown Tool Co., 10465 Carnegie Avenue, Cleveland, Ohio, agents for Barber-Colman Co., Rockford, Ill., for the past several years in the Cleveland territory, have now taken on the distributing agency for the Barcol Overdoor and Barber-Colman Door Operating equipment, products of the electrical apparatus division of Barber-Colman Co.

Ball bearings will be standard equipment on all motors built by the Lincoln Electric Co., Cleveland, sleeve bearings being supplied only on order, according to an announcement of the company.

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